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WATER POLLUTION SURVEILLANCE SYSTEM. VOLUME 1. NORTHEAST BASIN

Public Health Service
Washington, D. C.

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NORTHEAST BASIN
Volume 1

Public Health Service

Water Pollution Surveillance System

ANNUAL COMPILATION OF DATA
October 1, 1962 - - - September 30, 1963

A Federal, State and Local cooperative report on water pollution surveillance of surface waters at selected locations throughout the United States

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, Division of Water Supply and Pollution Control
Washington, D.C. 20201

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National Water Quality Network
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Public Health Service Publication No. 663—Supplement 1

National Water Quality Network
Annual Compilation of Data, October 1, 1958–September 30, 1959
Public Health Service Publication No. 663 (1959 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1959–September 30, 1960
Public Health Service Publication No. 663 (1960 Edition)

National Water Quality Network
Plankton Population Dynamics, July 1, 1959–June 30, 1961
Public Health Service Publication No. 663—Supplement 2

National Water Quality Network
Annual Compilation of Data, October 1, 1960–September 30, 1961
Public Health Service Publication No. 663 (1961 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1961–September 30, 1962
Public Health Service Publication No. 663 (1962 Edition)

ACKNOWLEDGMENT

To increase the usefulness of the water quality data, annual compilations since 1958, including this one, have presented preliminary and unadjusted flow data for gaging stations at or near most of the Public Health Service Water Pollution Surveillance System sampling points. Final data may be obtained directly from the agency concerned. Any studies using the provisional flow data herein compiled should verify the data prior to completion of reports on such studies. For making the flow information available for this publication, grateful acknowledgment is made by the Public Health Service to:

The International Boundary and Water Commission,
United States and Mexico

The International Joint Commission, United States and Canada

The U.S. Department of the Interior
Bureau of Reclamation • Geological Survey

The U.S. Department of the Army
Corps of Engineers • Lake Survey

FOREWORD

This is the sixth annual compilation of data from the Public Health Service Water Pollution Surveillance System (formerly the National Water Quality Network). During this year, the System was increased from 122 to 128 stations. In order to provide data in a form more useful for local or regional water pollution control officials and their staffs, the present compilation is published in 11 separate volumes. The surveillance data reported herein reveal additional findings on pesticides and other organic chemicals in surface waters and on trends in radioactivity and other areas.

The Public Health Service gratefully acknowledges the assistance to our Surveillance System of the participating local, State and Federal Government agencies and private industry. The success of this program depends, in a large measure, upon their continued interest and support.

GORDON E. MCCALLUM, D. Sc.,
Assistant Surgeon General,
Chief, Division of Water Supply and Pollution Control

VOLUME 1

Northeast Basin

CONNECTICUT RIVER
at Enfield Dam, Conn.
below Northfield, Mass.
at Wilder, Vt.

HUDSON RIVER
below Poughkeepsie, N.Y.

LAKE ERIE
at Buffalo, N.Y.

MERRIMACK RIVER
above Lowell, Mass.

RARITAN RIVER
at Perth Amboy, N.J.

ST. LAWRENCE RIVER
at Massena, N.Y.

VOLUME 2

North Atlantic Basin

DELAWARE RIVER
at Philadelphia, Pa.
at Trenton, N.J.
at Martins Creek, Pa.

POTOMAC RIVER
at Washington, D.C.
at Great Falls, Md.
at Williamsport, Md.

SCHUYLKILL RIVER
at Philadelphia, Pa.

SHENANDOAH RIVER
at Berryville, Va.

SUSQUEHANNA RIVER
at Conowingo, Md.
at Sayre, Pa.

VOLUME 3

Southeast Basin

APALACHICOLA RIVER
at Chattahoochee, Fla.

CHATTAHOOCHEE RIVER
at Columbus, Ga.
at Lanett, Ala.
at Atlanta, Ga.

ESCAMBIA RIVER
at Century, Fla.

ROANOKE RIVER
at John H. Kerr Dam and
Reservoir, Va.

SAVANNAH RIVER
at Port Wentworth, Ga.
at North Augusta, S.C.

TOMBIGBEE RIVER
below Columbus, Miss.

VOLUME 4

Western Great Lakes and Lake Erie Basins

WESTERN GREAT LAKES

DETROIT RIVER
at Detroit, Mich.

LAKE MICHIGAN
at Gary, Ind.
at Milwaukee, Wis.

LAKE SUPERIOR
at Duluth, Minn.

ST. CLAIR RIVER
at Port Huron, Mich.

ST. MARYS RIVER
at Sault Ste. Marie, Mich.

LAKE ERIE BASIN

CUYAHOGA RIVER
at Cleveland, Ohio

MAUMEE RIVER
at Toledo, Ohio

VOLUME 5

Ohio and Tennessee River Basins

OHIO RIVER BASIN

ALLEGHENY RIVER
at Pittsburgh, Pa.

CUMBERLAND RIVER
at Clarksville, Tenn.

KANAWHA RIVER
at Winfield Dam, W. Va.

LITTLE MIAMI RIVER
at Cincinnati, Ohio

MONONGAHELA RIVER
at Pittsburgh, Pa.

OHIO RIVER
at Cairo, Ill.
at Evansville, Ind.
at Louisville, Ky.
at Cincinnati, Ohio
at Huntington, W. Va.
below Addison, Ohio
at Toronto, Ohio

WABASH RIVER
at New Harmony, Ind.

TENNESSEE RIVER BASIN

CLINCH RIVER
above Kingston, Tenn.
at Clinton, Tenn.

TENNESSEE RIVER
at Pickwick Landing, Tenn.
at Bridgeport, Ala.
at Chattanooga, Tenn.
at Lenoir City, Tenn.

VOLUME 6

Upper Mississippi River Basin

ILLINOIS RIVER
near Grafton, Ill.
at Peoria, Ill.

MISSISSIPPI RIVER
at Cape Girardeau, Mo.
at East St. Louis, Ill.
at Burlington, Iowa
at Dubuque, Iowa
at Lock and Dam 3 below St. Paul, Minn.

RAINY RIVER
at Baudette, Minn.
at International Falls, Minn.

RED RIVER (NORTH)
at Grand Forks, N. Dak.

VOLUME 7

Missouri River Basin

BIG HORN RIVER
at Hardin, Mont.

BIG SIOUX RIVER
below Sioux Falls, S. Dak.

KANSAS RIVER
at DeSoto, Kans.

MISSOURI RIVER
at St. Louis, Mo.
at Missouri City, Mo.
at Kansas City, Kans.
at St. Joseph, Mo.
at Omaha, Nebr.
at Yankton, S. Dak.
at Bismarck, N. Dak.
at Williston, N. Dak.

NORTH PLATTE RIVER
above Henry, Nebr.

PLATTE RIVER
above Plattsmouth, Nebr.

SOUTH PLATTE RIVER
at Julesburg, Colo.

YELLOWSTONE RIVER
near Sidney, Mont.

VOLUME 8

Southwest-Lower Mississippi River Basin

ARKANSAS RIVER
at Pendleton Ferry, Ark.
at Little Rock, Ark.
near Forth Smith, Ark.
near Ponca City, Okla.
at Coolidge, Kans.

MISSISSIPPI RIVER
at New Orleans, La.
at Delta, La.
at Vicksburg, Miss.
at West Memphis, Ark.

OUACHITA RIVER
at Bastrop, La.

RED RIVER (SOUTH)
at Alexandria, La.
at Bossier City, La.
at Index, Ark.
at Denison, Tex.

VERDIGRIS RIVER
at Nowata, Okla.

VOLUME 9

Colorado River and Western Gulf Basins

COLORADO RIVER BASIN

ANIMAS RIVER
at Cedar Hill, N. Mex.

COLORADO RIVER
at Yuma, Ariz.
above Parker Dam, Ariz.-Calif.
near Boulder City, Nev.
at Page, Ariz.
at Loma, Colo.

GREEN RIVER
at Dutch John, Utah

SAN JUAN RIVER
at Shiprock, New Mex.

WESTERN GULF BASIN

RIO GRANDE
at Brownsville, Tex.
at Laredo, Tex.
at El Paso, Tex.
below Alamosa, Colo.

SABINE RIVER
near Ruliff, Tex.

VOLUME 10

Pacific Northwest and Alaska Basins

PACIFIC NORTHWEST

CLEARWATER RIVER
at Lewiston, Idaho

COLUMBIA RIVER
at Clatskanie, Oreg.
at Bonneville, Oreg.
at McNary Dam, Oreg.
at Pasco, Wash.
at Wenatchee, Wash.
at Northport, Wash.

PEND OREILLE RIVER
at Albeni Falls Dam, Idaho

SNAKE RIVER
at Ice Harbor Dam, Wash.
at Wawawai, Wash.
at Payette, Idaho

SPOKANE RIVER
at Post Falls Dam, Idaho

WILLAMETTE RIVER
at Portland, Oreg.

YAKIMA RIVER
at Richland, Wash.

ALASKA BASIN

CHENA RIVER
at Fairbanks, Alaska

SHIP CREEK
at Anchorage, Alaska

VOLUME 11

California and the Great Basins

CALIFORNIA BASIN

KLAMATH RIVER
near Keno, Oreg.

SACRAMENTO RIVER
at Greens Landing above Courtland, Calif.

SAN JOAQUIN RIVER
near Vernalis, Calif.

GREAT BASIN

BEAR RIVER
above Preston, Idaho

TRUCKEE RIVER
at Calif.-Nev. Border
at Farad, Calif.

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ANALYTICAL AND FLOW DATA INDEX

STATION	General Description Trace Elements, Strontium 90	Radioactivity Determinations	Plankton Populations	Organic Chemicals	Chemical, Physical and Bacteriological Analyses	Flow Data
	Page No.	Page No.	Page No.	Page No.	Page No.	Page No.
Connecticut River						
at Enfield Dam, Conn	25–26	27	28–29	30	31–32	33
below Northfield, Mass	35–36	37	38–39	40	41–42	43
at Wilder, Vt	45–46	47	48–49	50	51–52	53
Hudson River						
below Poughkeepsie, N.Y	55–56	57	58–59	60	61	62
Lake Erie						
at Buffalo, N.Y	63–64	65	66–67	68	69–70	71
Merrimack River						
above Lowell, Mass	73–74	75	76–77	78	79–80	81
Raritan River						
at Perth Amboy, N.J	83–84	85–86	88–89	87	90–93	94
St. Lawrence River						
at Massena, N.Y	95–96	97	98–99	100	101–102	103

E R R A T U M

Public Health Service Water Pollution Surveillance System
Annual Compilation of Data
October 1, 1962 - September 30, 1963
(Publication No. 663 revised)

VOLUME I - NORTHEAST BASIN

Page 83, second paragraph should read:

The Middlesex County Sewerage Authority Plant has provided primary treatment since it was placed in operation in January 1958.

THE PUBLIC HEALTH SERVICE

Water Pollution Surveillance System

The Public Health Service program for providing fundamental information on the quality of the Nation's waters stems from Public Law 660, approved July 9, 1956, as amended by Public Law 87-88, July 20, 1961. Section 4(c) thereof states: ". . . the Secretary (of Health, Education, and Welfare) shall in cooperation with other Federal, State, and local agencies having related responsibilities, collect and disseminate basic data on chemical, physical, and biological water quality insofar as such data or other information relate to water pollution and the prevention and control thereof."

To fulfill this responsibility, the Public Health Service Water Pollution Surveillance System collects, interprets, and disseminates:

a. Information on changes in water quality at key points in river systems, as such quality may be affected by changes in water use and development.

b. Continuous information on the nature and extent of pollutants affecting water quality.

c. Data which will be useful in the development of comprehensive water resources programs.

d. Data which will assist State, interstate, and other agencies in their water pollution control programs, and in the selection of sites for legitimate water uses.

Some 50 sampling stations were established when the program started, October 1, 1957. By September 30, 1963, the number had grown to 128.

Each sampling location satisfies one or more of the following criteria:

a. Major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

b. Interstate, coastal, and international boundary waters.

c. Waters on which activities of the Federal Government may have an impact.

Sampling station sites are fixed only after consultation with local, State, Federal and other agencies having related interests.

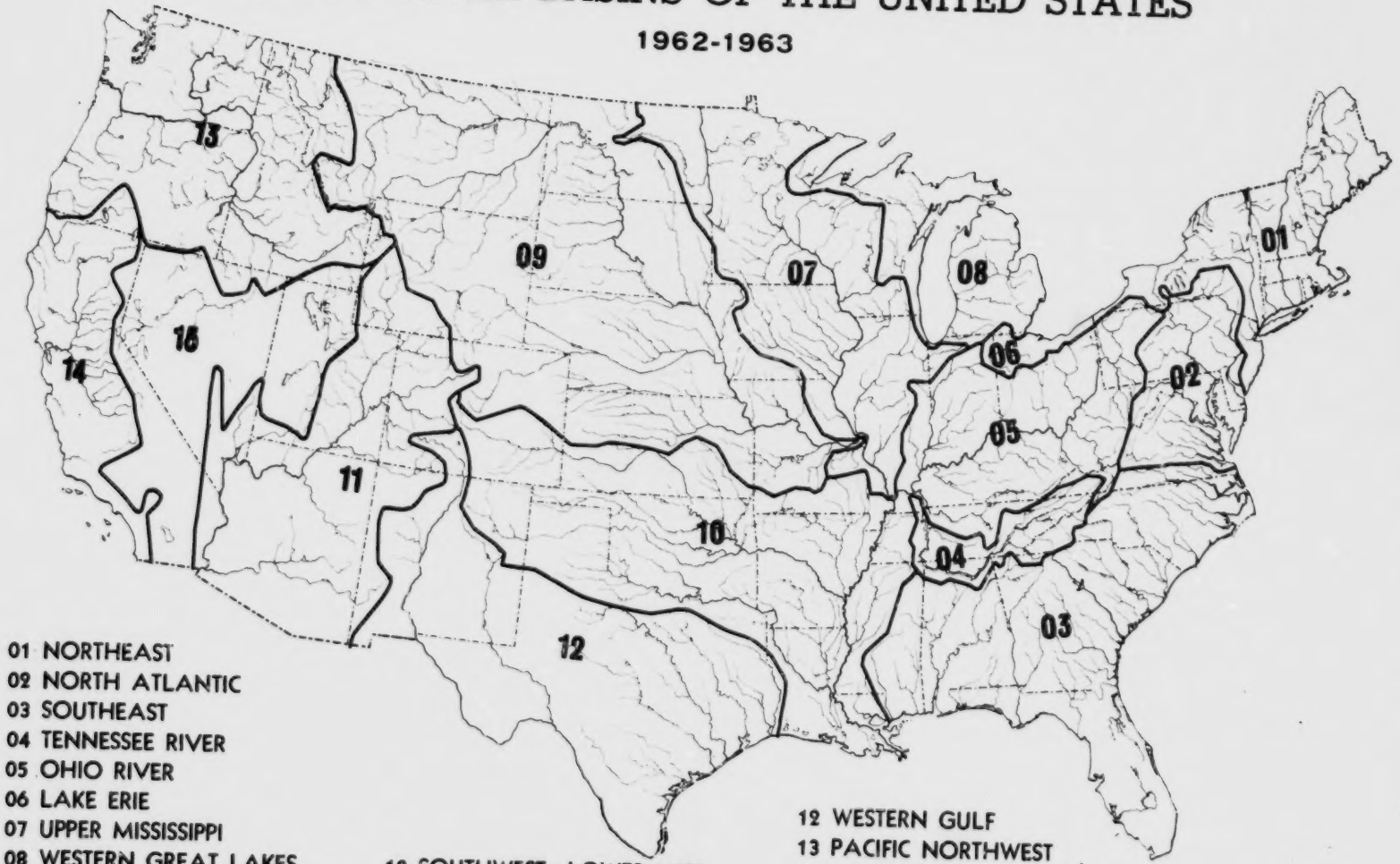
Active local participation is important in this operation. It assures maximum development of all information valuable both locally and nationally. Program costs are shared by the Federal Government and State and local agencies, those of the latter through contributions of laboratory and sampling manpower. Specifically, the State and local agencies perform certain of the conventional chemical analyses and collect samples for the newer, more complex examinations. The Public Health Service, in turn, performs the more complex determinations and makes the results available to the participants and to the public. In addition, the consultation, training facilities, and other resources of the Public Health Service are available to the cooperating agencies.

Locations of sampling stations in operation as of September 30, 1963, are shown on page 2. Descriptions of the stations, participating agencies, and other pertinent information are presented with the station data.

PHS Water Pollution Surveillance System

MAJOR RIVER BASINS OF THE UNITED STATES

1962-1963



01 NORTHEAST
02 NORTH ATLANTIC
03 SOUTHEAST
04 TENNESSEE RIVER
05 OHIO RIVER
06 LAKE ERIE
07 UPPER MISSISSIPPI
08 WESTERN GREAT LAKES
09 MISSOURI RIVER

10 SOUTHWEST—LOWER MISS.
11 COLORADO RIVER

12 WESTERN GULF
13 PACIFIC NORTHWEST
14 CALIFORNIA
15 GREAT BASIN

Only after careful screening of needs in water resource development was a pattern set for analyses of water samples.
All System samples are examined for:

a. Radioactivity.
   (1) Gross alpha.
   (2) Gross beta.
   (3) Strontium 90.
b. Plankton populations.
c. Coliform organisms.
d. Organic chemicals.
e. Biochemical, chemical, and physical measurements, including biochemical oxygen demand (BOD), dissolved oxygen (DO), chemical oxygen demand (COD), chlorine demand, ammonia nitrogen, hydrogen ion concentration (pH), color turbidity, temperature, alkalinity, hardness, chloride, sulfate, phosphates and total dissolved solids.
f. Sodium, potassium, fluoride and trace elements.

Samples for groups c and e were collected and analyzed weekly. Samples for organic chemicals were collected and analyzed monthly and plankton organism examinations were conducted semimonthly. Water samples for analysis of suspended and dissolved gross alpha and beta radioactivity were submitted weekly. Strontium 90 analyses were made on composites of weekly samples accumulated over 3-month periods. Sodium, potassium, fluoride, and trace metals were also determined on 3-month composites of weekly samples. New parameters which are developed and found significant will be included as the program continues.

Analytical Methods and Reliability of Data

The physical, chemical and biochemical data documented in this publication are the result of efforts of the cooperating agencies. In general, about half of these measurements were contributed by their laboratories. Specifically, all measurements reported for temperature, pH, DO, BOD, COD, chlorine demand and ammonia nitrogen were performed by the participants at the sample collection point. In addition, about 45 of the participating groups regularly perform all or most of the determinations for the remaining parameters included in the data. Whenever possible, analyses for stable constituents not completed by the participants are completed in the central Water Quality laboratories. While individual laboratories make minor modifications to meet local conditions, the methods used in most cases are those published in the 11th edition, "Standard Methods for the Examination of Water and Wastewater" (22). For uniformity, the chlorine demand test is reported on the basis of the starch-iodide titration procedure, and the chemical oxygen demand test is restricted to the use of 0.025 N reagents.

To assure continued reliability in the published data, frequent analysis of reference samples are made by each cooperating laboratory as an integral part of the overall program. Periodically a synthetic standard sample is provided to each participant for reference analysis. The reported results are reviewed. Any significant errors are called to the attention of the reporting laboratory and, after the cause of the errors has been determined, the previously submitted data are either corrected or discarded. From these findings, the analyses reported in this compilation are believed to be accurate to ± 10 percent of the reported values.

The analytical methods used by the Public Health Service laboratories are described in the discussion of water quality parameters which follows, and are covered by references listed in the Bibliography.

Water Pollution Parameters

In the assessment of water pollution, all of the legitimate purposes for which raw waters can be used, and which may be affected by pollution, must be considered. These may range from the minimum requirements for navigation to the ultimate in water quality demanded for certain industrial processing. Standards differ considerably, therefore, according to water use.

For domestic use, water must be free of disease organisms, clear, colorless, taste- and odor-free, and have a relatively low dissolved mineral content. Agricultural water is judged primarily on its mineral content, especially with respect to the ratio of sodium to other cations, and the presence of boron. Water for fish propogation and recreational purposes must be relatively free from domestic and industrial pollution and must be able to sustain an active flora of the smaller aquatic organisms on which fish and wildlife feed. Industrial water quality demands run the gamut from the complete absence of minerals to a requirement of low temperature, the critical factor in water used for cooling. The effects of radioactive materials on these uses have not yet been fully appraised.

The various laboratory examinations made as part of this program are discussed below.

Radioactivity

Radioactivity, long recognized as a water contaminant from natural sources, has continued to grow in importance and health significance with the development of nuclear energy for both military and peaceful uses. Consequently, levels must be measured continually as new sources are established.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The total radioactivity in the dissolved solids provides a rough measure of the levels which may be found in a treated water, where water treatment removes substantially all of the suspended matter.

Beta activity levels generally reflect the variable contamination resulting from fallout and discharges from nuclear energy installations, institutions utilizing radioactive materials, and other manmade sources. The trend of gross beta radioactivity in samples received from 47 of the Public Health Service Water Pollution Surveillance System stations operating since 1957 is presented in Figure 1. During the first three quarters of the 1962 water year, renewed weapons testing resulted in a rise in gross beta radioactivity in surface waters of the United States. During the sec-

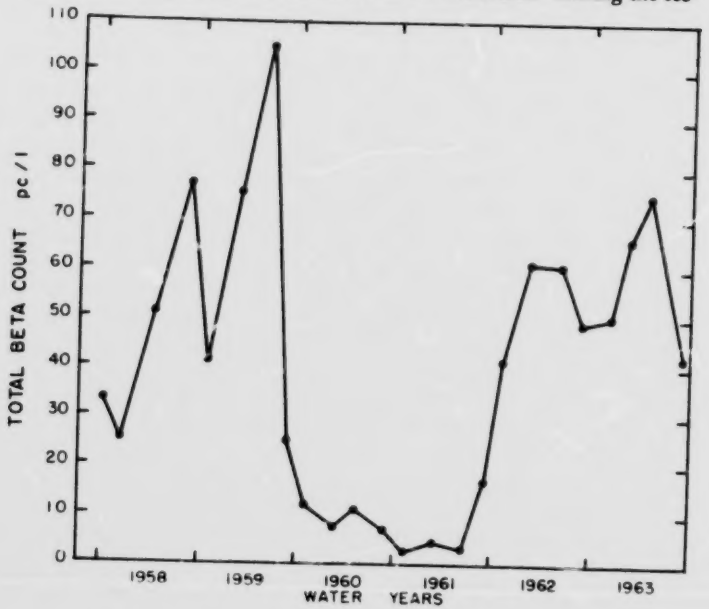


FIGURE 1. GROSS BETA RADIOACTIVITY IN THE SURFACE WATERS OF THE UNITED STATES.

ond and third quarter of water year 1963, the national average activity reached a maximum of 75 pico curies per liter and then decreased. Beta levels have remained well below the Public Health Service Drinking Water Standard of 1,000 pc/l or $\mu\mu c/l$ (26).

Alpha levels reflect largely the activity added by uranium and thorium daughters. The waters of the United States can be characterized in a general way with respect to gross alpha radioactivity content. Gross alpha levels average less than 1 pc/l in east coast, Appalachian, Great Lakes, and Pacific Northwest States. On the Colorado Plateau, and along the eastern slope of the Rocky Mountains, natural radioactivity, principally from mineral deposits, results in average concentrations of about 20 pc/l.

Gross levels are most informative in ascertaining long-term trends or changes in water quality. By themselves, however, they are of limited value in assessing radiation exposure. Where gross results are consistently over the maximum permissible concentrations for mixed fission products, the identity of the specific radionuclides involved must be established.

Because of its significance in the environment, the concentration of strontium 90 in the total solids is also reported. In water year 1963, strontium 90 levels ranged from 0.4 to 11.3 pc/l. The national average reached a high of 3.8 pc/l during the fourth quarter (July, August, September 1963). Highest levels were in the north-central area of the coterminous United States where the average was approximately 6 pc/l for this quarter. All averages were less than the limit (10 pc/l) specified in the Public Health Service Drinking Water Standards (26). The levels of strontium 90 activity in waters of the United States since the first quarter of the 1959 calendar year are presented graphically in figure 2.

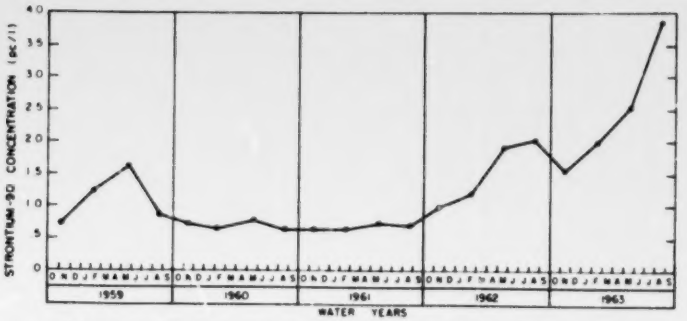


FIGURE 2. STRONTIUM-90 IN SURFACE WATER OF THE UNITED STATES

Plankton Populations

Geographical distribution of algae and other planktonic organisms are influenced by geologic and climatic factors, and result in distinctive plankton populations in different areas. Within each region, population changes are directly related to temperature, and the nature and concentration of organic and mineral substances which enter the aquatic environment. These substances may come from domestic sewage, industrial wastes, runoff from agricultural lands, irrigation discharges, or native rocks and soils. They may be basic nutrients, highly toxic or metabolically inert. Planktonic organisms differ greatly in their sensitivity to the nutrient and toxic substances which are present. Some thrive only in water which is relatively free of nutrients while others multiply rapidly in water which has been greatly enriched. Large numbers of tolerant algae usually develop in waters containing abundant supplies of inorganic nitrogen and phosphorus resulting from the mineralization of domestic sewage. These nuisance populations may clog filters in municipal water plants, and produce objectional tastes and odors.

On the other hand, plankton populations may be eradicated by the introduction of toxic organic or mineral wastes. This is not desirable because some plankton organisms play essential roles in providing food and oxygen for higher forms of aquatic life, and in cleansing polluted waters.

Beginning at low nutrient levels, progressive enrichment of waters results in an increase in the variety and abundance of the plankton. However, as higher levels of enrichment are attained, the increase in total numbers of organisms is accompanied by a decrease in the number of kinds of organisms. This change is typical in populations which have been subjected to the wide spectrum of substances being introduced into

surface water in ever increasing amounts. Plankton counts, which provide information concerning the variety and abundance of organisms, are useful in detecting changes in the concentration of organic and mineral substances which enter water supplies.

METHODS OF ANALYSIS

Plankton samples are collected semimonthly at each station. A sample consists of 3 liters of raw water taken directly from the stream or from a treatment plant intake. Preservation is effected at the time of collection by the use of 30 ppm merthiolate.

Three types of analyses are performed:

1. Rotifers, crustacea, and other micro invertebrates are removed from a 1-liter aliquot of the sample by settling 24 hours. The sediment is placed in a special slide, 80 x 50 x 2 mm., and the organisms are enumerated under a compound microscope at 100× magnification. The counts are reported as organisms per liter.

2. A "total live algae" count is obtained from 1 milliliter of the sample by scanning two 50-mm. strips on a Sedgwick-Rafter slide using 200× magnification and a Whipple micrometer disc. An appropriate correction factor is used to convert the counts to units per milliliter. Each single cell or natural aggregate of cells (colony) occupying up to 300 square microns (μ^2) is counted as 1 unit. Large colonies are enumerated according to a modified areal-unit method in which aggregates occupying 300–1,000μ^2 are counted as 2 units, those occupying 1,000–2,500μ^2 as 3 units, those 2500–5000μ^2 as 4 units, and those over 5,000μ^2 as 5 units. About 95 percent of cell aggregates fall into size 1 or 2.

3. Identification and proportional census of diatom species are done from sediment obtained by settling 1 liter of the sample 48 hours. A small aliquot of the sediment is placed on a No. 1 coverglass and dried on a warming table. The sediment is ashed on the coverglass by heating on a hotplate, and permanent slides are made with hyrax mounting medium. Counts are made with 90× apochromatic oil immersion objectives and 10× oculars containing a Whipple micrometer disc. Random strip counts are made until the total number of units reaches 200 to 300. The same areal units are used as described for Sedgwick-Rafter counting.

Organic Chemicals

The Nation's water resources continue to receive increasing quantities of organic contaminants. Since 1940 the chemical industry, particularly in the manufacture of synthetic and petrochemicals, has experienced an enormous expansion that shows every sign of continuing. Each year millions of pounds of synthetic detergents, insecticides, herbicides, and similar domestic products find their way into our streams from household sewers, industrial waste discharges, and land runoff.

Effective and economical treatment methods for most of the complex organic materials remain to be developed. Even where treatment exists, residues may remain in sufficient quantity to cause water damage. These stable residues persist through sewage treatment, biological and chemical action of the stream, and water treatment processes, and finally reach the consumer in drinking water.

The presence of some of these materials, even at concentrations considerably less than 1 part per million, may impair water quality, most noticably in production of tastes and odors. Fishflesh tainting, also quickly noticed by the consumer, is another damage. Effects on water treatment, many of which are ill-defined at present, and impairment of water quality for industrial uses are being reported with increasing frequency. Essentially nothing is known of the possible immediate or long-term effects of these materials on human health. Such information is urgently needed.

The usual sanitary analyses are not effective in measuring these newer organic contaminants. Yet it is essential to know something of their concentrations and character. A method known as the "Carbon Adsorption Technique," developed by the Public Health Service, permits the concentration of these organic compounds from a large volume of water. Elution of the adsorbed materials with organic solvents, followed by chemical separation and testing, provides useful information concerning organic pollution and for assaying river systems for these substances.

Following continuous flow of about 5,000 gallons of water through the carbon adsorption column over a 7- to 10-day period at 0.5 gpm, material on the carbon adsorption column is extracted with two solvents, chloroform and alcohol. The residues are weighed. The concentration of these materials in the water sampled is then computed. See Explanation of Analytical Data, page 21.

CHLOROFORM EXTRACTS

The organic residue recovered from the carbon adsorption column by chloroform is very complex. It is desirable to separate the crude extract into certain broad chemical classes, and this can be done on the basis of solubility differences. The various classes or groups and their general significance are discussed briefly below.

Ether Insolubles

This group is usually a brown, humuslike powder, apparently composed to a large extent of carboxylic acids, ketones, and alcohols of complicated structure. Origin of the group, which is an indicator of "old" pollution, is believed to be partially oxidized sewage and industrial wastes. For example, the Ohio River at Cincinnati has been exposed to much industrial and sewage pollution, and hence large amounts of ether insoluble materials are found. Streams with little or no pollution history have little or no ether insolubles. Chloroform extracts contain from 0 to 30 percent of ether insoluble material.

Water Solubles

These substances are largely acidic and undistillable at moderate temperatures, but their solubility in ether indicates that the molecules are smaller and probably simpler than the ether-solubles. On the other hand, their water solubility practically requires the presence of several functional groups, such as hydroxy-acid, keto-acid, and keto-alcohol. Such compounds probably originate from partial oxidation of hydrocarbons or they may be natural substances. They have very little odor. These materials usually make up 10 to 20 percent of the total extract.

Weak Acids

This group is characterized by being removed from ether solution with sodium hydroxide but not with sodium bicarbonate. Phenols are the best known weak acids, and if present in the water, appear in this group. Other weakly acidic compounds include certain enols, imides, sulfonamides, and some sulfur compounds. This group of materials also occurs in nature. The weak acids are odorous, and commonly constitute 5 to 20 percent of the chloroform extract.

Strong Acids

These acids are usually carboxylic acids such as acetic, benzoic, salicylic or butyric. Although classified as strong in reference to carbonic acid, they are actually weak when compared with a mineral acid, such as sulfuric. Many of the compounds are used industrially, but may also be produced by natural processes, such as fermentation. Some of the materials are highly odorous. This fraction makes up from 5 to 20 percent of the total. The significance of the strong acids can be interpreted only in the light of stream pollution conditions.

Bases

These compounds are organic amines. Such materials as aniline and pyridine are amines of commerce. Lower amines may occur as a result of decomposition. Although odorous, the low concentrations found are not likely to cause objectionable conditions. However, in the case of specific amine-containing wastes the compounds can be of considerable significance. Generally, only 1 or 2 percent of the total extract is made up of the bases.

Neutrals

This group frequently constitutes the major portion of the chloroform extract. Neither basic nor acidic, the materials are less reactive and tend to persist in streams longer than many other types. Hydrocarbons, aldehydes, ketones, esters, and ethers are examples of neutral materials. The group lends itself to further fractionation by means of chromatographic separation into aliphatic, aromatic, and oxygenated subgroups:

Aliphatics: This portion represents petroleum type hydrocarbons in a considerable state of purity, and is usually made up of mineral oil type of material. The percentage of aliphatics present yields important information about the possible source of pollution, since petroleum is the most likely source.

Aromatics: These are principally the coal tar hydrocarbons such as benzene, toluene, and a host of others, and their presence in any significant amount is a reliable indication of industrial pollution. Further, the materials can frequently be identified by infrared spectrophotometry. Some aromatic compounds which have been found in our rivers—and in our drinking water—include DDT, aldrin, endrin, dieldrin, phyenyl ether, orthonitrochlorobenzene, pyridine, phenol, and others. The materials are highly odorous, and may also be toxic. Their appearance in any quantity as pollutants should receive careful evaluation.

Oxygenated compounds (Oxys): These are the neutral compounds containing oxygen, such as aldehydes, ketones, and esters. They may have originated by direct discharge or may represent oxidation products from both natural and industrial materials. They help to indicate the "age" of the pollution, since pollution exposed to oxidation forces for a long time would be expected to contain large amounts of oxys. The oxy materials are odorous.

Losses

Manipulative losses inherent in this type of separation may amount to 10 to 15 percent. Losses greater than this may indicate that volatile components were lost from the sample. Such volatiles may have significance as pollutants.

ALCOHOL EXTRACTS

The alcohol extractables generally consist of materials more polar than the chloroform extractables. They often contain synthetic detergents, carboxylic acids and humic materials which may originate naturally or from oxidized products of domestic and industrial wastes. These classes of substances are not quantitatively recovered by the alcohol extraction. For example, this extraction recovers only 20 to 30 percent of the synthetic detergents present. On waters of mixed industrial and domestic pollution, the chloroform and alcohol extractables may be about equal. On some streams where the industrial pollution is rather low and much natural pollution or sewage is present, the alcohol extractables may exceed the chloroform extractables by a factor of 4 to 6.

The alcohol extract is usually only partially soluble in water and most ordinary solvents. Very little further chemical separation of this material is currently practical. However, tests have revealed that synthetic detergents may make up 1 to 12 percent of the alcohol extract.

OTHER TESTS

Infrared spectra are routinely run on the total chloroform and alcohol extracts as well as the neutral, aliphatic, aromatic and oxygenated groups which are usually the most significant. Spectra of other groups are obtained when there is an indication that they may be significant. These spectra reveal something of the chemical structure of the materials, indicate differences and in certain instances provide a definite identification. In the case of the alcohol extracts, the infrared spectra will indicate the presence of synthetic detergents if the materials constitute a significant portion.

Thin layer chromatography has been applied successfully to the resolution of the aromatic and basic fractions of CCE. Gas chromatographic equipment with flame ionization, electron-capture and microcoulometric detectors have also been used freely in the identification of specific substances.

COMPOSITE ANALYSIS

Samples from certain locations have been selected for analysis on a quarterly composite basis. Stations that have collected at least 12 samples in a nearly consecutive manner and averaged 100 ppb. or less of chloroform extractables are selected for such analysis when certain other conditions are met. However, samples falling in this category are analyzed individually when the recovery of the chloroform extract is exceptionally high and/or it is unusual in its infrared spectrum or some other physical characteristic.

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SPECIFIC IDENTIFICATIONS

Information about specific organic substances which were identified in carbon adsorption samples is given on the second page of the group associated with each station. The increased number of pesticide and other specific compounds identified, as compared to previous years, is partly associated with greater sensitivity in analytical methodology and may be partly a reflection of the increasing usage of these substances in the total environment.

Chemical, Physical, and Bacteriological Examinations

The various biochemical, chemical, physical, and bacteriological examinations generally performed by the participating laboratories are discussed below.

AMMONIA NITROGEN AND CHLORINE DEMAND

The cost of water treatment for domestic use is affected by the consumption of chlorine, with ammonia nitrogen being responsible for a large portion of the chlorine demand. The greater this demand, the more expensive is the treatment. The ammonia may originate from unstabilized domestic pollution, from industrial waste discharges, from run-off containing fertilizers used in farming operations or from all three. The presence of measurable quantities of nitrogen compounds, not necessarily ammonia, is also an indication of the fertility of the stream toward both macro- and micro-biological forms.

COLOR

Color in domestic water supplies is undesirable. Its removal in the water treatment process, whether it be from natural or industrial sources, may require large doses of chemicals and be expensive.

DISSOLVED OXYGEN, BIOCHEMICAL AND CHEMICAL OXYGEN DEMANDS

Biochemical processes, in which aquatic organisms attack and stabilize the organic matter present, require dissolved oxygen. If unstable oxidizable organic matter is present in excess, the organisms will multiply rapidly, consuming the oxygen present in the water, and bring about a foul, septic stream condition. The dissolved oxygen level thus serves to indicate the biochemical activity of the stream. High activity, resulting in low dissolved oxygen levels, will drive out game fish in favor of scavengers. Very low or zero oxygen levels will kill all fish and aquatic organisms dependent on dissolved oxygen for life. Temperature and reaeration rates also affect dissolved oxygen levels.

The 5-day biochemical oxygen demand (BOD) indicates the degree of unstabilized organic pollution from either domestic or industrial sources, to which the stream is being subjected. A significant demand will affect the fish and macroorganism population, and waters carrying a high BOD seldom contain game fish. On the other hand, game fish will thrive in streams in which the oxygen demand has been stabilized, as this condition is usually favorable for the growth of organisms on which fish feed.

The chemical oxygen demand analysis serves to support the findings of the biochemical oxygen demand test. It too may indicate to what extent the waste load of the stream has been stabilized, or it may indicate the presence of organic and inorganic pollution which is not readily oxidized by biological processes. Because the chemical oxygen demand can be determined quickly in comparison to the biochemical oxygen demand, the establishment of a correlation between the two parameters serves to reduce the number of the latter determinations required. The chemical demand results are nearly always higher than the biochemical demand.

TEMPERATURE

Temperature is particularly important to conservation and industry. A few degrees elevation in temperature due to cooling water discharges may seriously limit the capacity of a stream to support fish life. Also, high water temperatures increase the cost of cooling water for

industrial operations. Cooling towers and other equipment for handling cooling water must be engineered to the temperature levels normally encountered.

MINERAL CONSTITUENTS

These determinations include alkalinity, hydrogen-ion concentrations (pH), hardness, chlorides, sulfates, and total dissolved solids. The pH indicates whether water is acidic or alkaline, corrosive or passive. Alkalinity is a measure of the neutralization reserve present, or the extent to which the water can resist a change from an alkaline to an acid condition upon addition of acidic chemicals. This information is important to the water treatment plant operator and to many other water users.

Hardness is not only a measure of the soap consuming property, but is also of importance in the treatment of boiler waters, where removal of hardness is one of the most important functions. Chloride, sulfate, and total dissolved solids add further information on the gross dissolved mineral content carried by the stream. These are of great importance when considering the taste or palatability of water. They are also important when the water is being demineralized for specific industrial processes, since the cost of demineralization is a direct function of the dissolved solids content of the water. In addition, waters of high saline content are less desirable and may at times even be unfit for municipal, irrigation, and other uses.

TURBIDITY

Turbidity of water is due to the suspension of clay, silt, finely divided organic matter, microscopic organisms, and other similar materials. Its presence is of particular importance in water treatment processes and in the propagation of fish and other aquatic life.

COLIFORM ORGANISMS

Information about fecal pollution is essential to water quality measurements. Data on coliform bacteria, used as indicators of pollution, help to point up the trends in the effectiveness of treatment of domestic waste discharges.

The delayed-incubation membrane filter technique is used for the coliform examination, instead of the fermentation tube (MPN) method. The latter necessitates transport of water samples to the Water Quality Section laboratory for examination, with a time lapse between collection and examination that can significantly change their microbial content. Also, some of the many other bacteria present in raw water might overgrow or otherwise inhibit the demonstration of the coliform organisms. In the delayed-incubation membrane filter procedure, the bacteria are filtered out from the fluid samples immediately after collection and the filters sent to the Water Quality Section laboratory on a preservative medium. In the laboratory the membrane filters carrying the bacteria are transferred to a medium selective for coliform organisms, then incubated and counted. The resulting counts approach very closely the actual numbers of coliform bacteria present in the water samples at the time of collection.

Unusual populations of coliform bacteria may mean increased pollution and ensuing loss of water quality. The Public Health Service Water Pollution Surveillance System studies and reports the trends in sewage pollution on streams as indicated by the trends of coliform counts.

Trace Elements and Other Determinations

This year's trace element data differ somewhat from data reported in previous compilations in that the manner of obtaining the data has been modified and the program of elements measured altered. The trace metals measurements are now obtained from a 3.4 meter direct reading spectrograph. Tin, antimony, and bismuth have been discontinued; arsenic, boron, phosphorus, aluminum, and strontium have been added. Increased sensitivity for several elements has been attained, especially zinc, manganese, and beryllium, resulting in fewer indeterminate values.

Twice during the year, 3-month composites of the weekly samples were prepared and subjected to analysis. Examinations covered those elements included in the Public Health Service Drinking Water Standards (*26*), and other metals considered to have possible physiological or

toxicological significance. The ultimate goal of this phase of the program is to provide background data on all elements which may be found in water and which may be of significance in water quality management.

In carrying out the spectrographic examination, the sample is first passed through a membrane filter, .045 micron pore size, to remove all suspended matter. An aliquot of sample is then acidified with redistilled nitric acid and evaporated to a concentration containing 100 mg. of dissolved solids in 5.0 ml. A portion of the prepared sample is placed in a porcelain boat and sparked using a rotating disc, with concentrations of the 19 programed elements measured on the direct reader (*12*).

Waters of low dissolved solids content can be concentrated to a greater degree than those having a high dissolved solids content, thus accounting for the variable sensitivity shown in the tabulations. Values followed by an asterisk (*) show the limits of sensitivity at which the test was performed and indicate that the ion being measured was not detected at that level.

It is known that trace concentrations of some ions are subject to precipitation and adsorption on container surfaces during storage. This applies particularly to iron and manganese which are subject to oxidation. Hence, all the values reported by the spectrographic method represent the quantity of metal in solution at the time of analysis to within about 10 percent.

The measurement of sodium and potassium is performed using a flame procedure. Fluoride is determined with the SPADNS reagent using the method described by Bellack and Schouboe (*3*). Boron, previously measured by the curcumin procedure, is now reported from the spectrograph. Measurement of selenium has been eliminated due to the general absence of this element from the samples examined.

The concentrations of surface active agents, reported as alkyl benzene sulfonate (ABS), in the Nation's surface waters is reported for the first time on a number of selected stations. As the capability of determining this pollutant increases, efforts will be made to include all sampling points in the Surveillance System. The data presented here were obtained using a modification of the Standard Methods methylene blue procedure on an automatic analyzer.

The Benthos

Animals and plants that live in or on the bottom substrata of lakes and streams are known as the benthos. This biological community includes such common animals as immature insects, worms, clams, snails, and crustacea. The benthic populations found on a stream bottom are largely determined by the type of substrate. Bottoms consisting of soft silty sediments are normally inhabited by animals that are able to burrow into the sediments and feed on organic detritus in the sediments. These include worms, clams, and certain insect larvae. The number of species is usually small in these habitats. Shallow streams with shoals, rapids, and riffles have more available niches for animals to occupy and the normal benthic fauna usually includes a large variety of organisms.

The benthic populations provide a basic indicator of general water quality. Whereas the plankton organisms move downstream with the current, and fish are able to migrate considerable distances, the benthos is a population relatively fixed on the bottom and the animals are subject to the water flowing over them. The benthic populations will therefore be influenced by the quality of the water.

The animals that make up the benthos have various life cycles. Insects may exist as aquatic larvae living in the bottom for as long as 2 years. They then emerge as adults and mate. The female deposits fertilized eggs into the stream. Some of the class produce young which attach themselves to fish. Some of the worms reproduce asexually. An analysis of the age structure of certain forms in the benthos may provide information on past conditions of the water.

Under conditions of good water quality the benthos should include a variety of species with no one species being present in excessive numbers. If the water should become degraded, certain species in the population, intolerant of the changed environment, will die out; and as the water quality deteriorates, increased numbers of species in the benthos will be eliminated. The one or more species that survive may be able to develop very large populations. Toxic materials in the water or deposited on the bottom may effectively eliminate all bottom life.

At each station where bottom samples are taken an attempt is made to find areas of suitable substrate. From these areas, where pos-

sible, a series of at least six quantitative samples is taken by means of suitable dredges or samplers. In riffles the Surber squarefoot sampler is used. In deep rivers the Ekman or Peterson dredge is used (see Standard Methods, for the Examination of Water and Wastewater, 11th edition, pp. 572–582) (22). A general qualitative collection of invertebrate life is usually made at all stations.

The bottom materials are screened in the field using a screen with 28 meshes to the inch. The concentrated sample is preserved in alcohol and returned to the laboratory.

In the laboratory the sample is transferred to pans and the macroscopic organisms are separated from the sediment and detritus. The animals are then identified as near to species as possible, enumerated, and weighed. Specimens are preserved and retained for future reference.

During this year benthos data were gathered for stations in the Ohio and Tennessee River basins only and are presented with the descriptive material for the appropriate stations. A supplemental analysis of these data will be published separately.

Fish Populations

Fish are a biological end product of the aquatic environment. They are an important source of food, and sport fishing is one of our leading forms of recreation. The maintenance of fish life has been recognized by the Congress, and by States which have protective pollution control legislation, as an important and legitimate use of our Nation's waterways. In other words, in measuring fish populations at Surveillance System stations, we are not measuring a parameter that affects a water use as in the case of other measurements presented in this compilation. but rather a unique parameter that is in itself considered a beneficial water use.

The water quality requirements and tolerance of aquatic life to different types of contaminants vary tremendously. It is this variability in response which makes living aquatic organisms usable indicators of environmental disturbance. Fish require water relatively high in dissolved oxygen, and are intolerant of many chemical and physical contaminants resulting from agricultural, industrial and mining practices. However, the tolerance of different species varies, and man-induced changes of the environment often affect one species more than another, producing imbalanced populations which quite often favor the species less desirable economically.

Moderate amounts of putrescible wastes may enrich the habitat, resulting in great increases in standing crops of fish present. However, under such conditions, the more tolerant and adaptable species may comprise a disproportionate share of the total population, and very sensitive species may be eliminated altogether. The effect of toxic wastes may vary from complete elimination of populations to a reduction in reproductive capacity, growth and resistance to disease and parasitism.

Fish kills are a spectacular and obvious indication that an abrupt change has taken place in the environment. However, because of high mobility resulting in rapid recruitment, the fish population in a river or stream may return to normal levels within a very short time after a kill.

Chronic pollution, to which the fish population must adjust over a period of time, will be reflected in the kinds and relative abundance of the fish species present. In addition to the species composition, the condition of the fish, their growth, reproductive success and certainly their palatability are factors of considerable importance in evaluating the suitability of a body of water for supporting usable stocks of fish.

During the current water year, data on fish populations were gathered for some stations in the Ohio and Tennessee River basins only, and are presented in tables in volume 5 for the appropriate stations.

Fish samples at these stations were collected primarily with rotenone and with an electrofishing device. Five percent emulsified rotenone was applied at suitable sites, where an area of 1 to 3 acres could be blocked off with nets during the rotenoning operation. Such sites were usually in the form of small coves along the shoreline, the mouths of small tributaries, or behind the partial enclosure created by navigational lock walls. An electrical shocking device was used along the shoreline both during the day and at night. In a few cases, samples were also collected with trammel nets and with short, 25-foot haul seines. Sampling with nets and seines was limited because of the paucity of habitat in large rivers which is suitable for using these types of gear.

With each method used sufficient sampling was done to collect as many species present as possible, and to obtain a measure of the relative abundance and size distribution of the various species. Every type of fishing gear is somewhat selective, and the data obtained may not be representative of the actual population composition present in the river at the time of sampling. However, the data obtained by a given method are quantitatively comparable and may be used to evaluate changes in the population composition resulting from natural and man-induced changes in the habitat. Comparisons should be based on samples collected with the same gear, during the same season of the year, and under similar conditions of stream flow and water temperature. These data will be particularly useful in determining the impact of changes in water quality on the fish populations of the Nation's rivers over long periods of time.

For convenience of comparison, the fish in the tables are grouped into six major categories based on food habits and methods of feeding:

I. Large, sight feeding carnivores that feed on other fish. This group includes most game species.

II. Species that feed primarily on insects. This group provides important forage for species in group I.

III. Species that feed primarily on plankton and algae. These also provide important forage for group I species.

IV. Species that feed primarily on mollusks.

V. Omnivores that feed indiscriminately on plant and animal matter from the bottom.

VI. Scavengers that take any available food. Some of the species in this group may sometimes act as predators. The group also includes many important food fish, and species that are tolerant of degraded conditions.

Because foods and feeding habits vary with size, age, and availability of food, there may be considerable overlap between groups. The species listed were grouped according to available literature regarding the main foods of adult specimens of each species.

In the field the total length of the fish was routinely measured to the nearest inch class on a one-half inch interval. Thus a fish in the 5-inch class would measure from 4.5 inches to slightly under 5.5 inches. If the end of the tail touched the dividing line between two length classes, the fish was included in the higher classification. The percent total number and weight are carried to the nearest one-tenth of 1 percent in the tables. The one-tenth of 1 percent was arbitrarily selected for purposes of tabulation, and does not imply such a high level of sampling accuracy.

The fish are listed by common names in the tables according to American Fisheries Society Special Publication No. 2 (1960), A List of the Common and Scientific Names of Fishes From the United States and Canada, Second edition (*1*).

Stream Flow

Stream flow data have a most important role in the utilization of water quality parameters such as are included in this report. For this reason, average daily flow records are reported for most of the sampling stations in the System.

All flow data included in this compilation are *provisional* data furnished by the agencies credited, and are subject to revision by such agencies prior to any final publication. With the exceptions mentioned, the flows are given as furnished to the Public Health Service.

The data were generally furnished in units of cubic feet per second. In general only the first three digits were considered significant. Because of machine limitations the data are reported here in thousand cubic feet per second. Even though three zeros may appear after the decimal, no artificial accuracy of measurement is implied. Only the first three digits should be considered significant. There are two exceptions:

(1) When the flow was over 1 million cubic feet per second, the first four digits are reported, and (2) at times when the Rio Grande flows were extremely low, the data were reported to tenths of a cubic foot per second. These figures are published showing 4 decimal places.

Flow data for sampling stations on the rivers of the Great Lakes system are reported as the monthly mean flow, as computed by the U.S. Lake Survey. In certain other rivers, flow data were computed by the Public Health Service from information supplied by the gaging agency. The methods of computations are shown as footnotes to the data for the applicable stations.

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Explanation of Analytical Data

RADIOACTIVITY DETERMINATIONS

In evaluating radioactivity data it should be noted that the reported errors represent counting errors only and the reported values are subject to other errors commonly associated with gross radioactivity analysis. (See Reference 22.)

A dash (—) in the count column signifies that no determination was made. An asterisk (*) following date of sample indicates that determinations are for composites of two or more samples taken on and before the date shown.

Strontium 90 determinations are reported in micro-microcuries per liter as measured from total solids in the sample composited for the quarter. A dash (—) indicates that no determination was made in that period.

PLANKTON POPULATION

Plankton data are reported on two pages. The first page lists the population size of various groups of algae. A coded number shows the ten most abundant genera of algae and their count level. Code numbers used are identified on page 18. Blank spaces on the data sheets signify that counts of other genera were below a level of 150 per ml. The second page of plankton data lists the four dominant diatom species and their occurrence as a percent of the total diatom population. The percent of occurrence of all other diatom species is shown in the next column. Identification codes of species are given on page 19.

The detectable numbers per ml. of fungi, sheathed bacteria and protozoa are shown in the next two columns. The rotifer and crustacea totals per liter are listed together with the genera where these occurred at a count level of five or more per liter for rotifers and three or more per liter for crustacea. Nematode and miscellaneous animal form counts per liter appear in the last two columns.

A dash (—) indicates that no analysis was made. A zero count of each group is indicated by "0". Blank spaces under abundance and dominance columns indicate that the populations were too few to be included or were absent. Coding for abundant genera of rotifer and crustacea population levels are presented on page 20.

PLANKTON POPULATION

Identification Codes of Algae Genera and Count Levels of Most Abundant Genera

KEY TO COUNT LEVEL (per ml.)

1 150 to 300
2 301 to 600
3 601 to 1,200
4 1,201 to 2,400
5 2,401 to 4,800
6 4,801 to 9,600
7 9,601 to 19,200
8 19,201 to 38,400
9 38,401 and over

Code to ALGAE GENERA (Producers)

Blue-green Algae

01 Agmenellum (Merismopedia)
02 Anacystis (Microcystis)
03 Anacystis
04 Coccochloris
05 Gomphosphaeria
06, 07, 08 Reserve
09 Other genus
10 Other genus

Filamentous blue-greens

11 Anabaena
12 Aphanizomenon
13 Arthrospira
14 Lyngbya
15 Oscillatoria
16 Phormidium
17 Raphidiopsis
18 Spirulina
19, 20, 21 Reserve
22 Other genus
23 Other genus

Coccoid green algae

24 Actinastrum
25 Ankistrodesmus
26 Chlorella-type
27 Chlorococcum
28 Closterium
29 Coelastrum
30 Crucigenia
31 Dictyosphaerium
32 Golenkinia
33 Lagerheimia
34 Micractinium
35 Oocystis
36 Palmellococcus
37 Pediastrum
38 Scenedesmus
39 Staurastrum
40 Tetradesmus
41 Tetrastrum
42, 43 Reserve
44 Other genus
45 Other genus

Filamentous green algae

46 Cladophora
47 Stichococcus
48 Stigeoclonium
49 Reserve
50 Other genus

Green flagellates

51 Chlamydomonas including Carteria
52 Euglena
53 Lepocinclis
54 Pandorina
55 Phacotus
56 Phacus
57 Trachelomonas
58 Reserve
59 Other genus

Other pigmented flagellates

60 Chromulina
61 Dinobryon
62 Gymnodinium
63 Peridinium
64 Reserve
65 Other genus

Diatoms (with chromatophores)

Centric

66 Biddulphia
67 Coscinodiscus
68 Cyclotella
69 Melosira
70 Rhizosolenia
71 Stephanodiscus
72 Other genus

Pennate

73 Achnanthes
74 Amphiprora
75 Amphora
76 Anomoeoneis
77 Asterionella
78 Caloneis
79 Cocconeis
80 Cymatopleura
81 Cymbella
82 Diatoma
83 Diploneis
84 Fragilaria
85 Gomphonema
86 Gyrosigma
87 Navicula
88 Nitzschia
89 Pleurosigma
90 Rhoicosphenia
91 Surirella
92 Synedra
93 Tabellaria
94, 95, 96 Reserve
97 Other genus
98 Other genus
99 Other genus

PLANKTON POPULATION

Identification Code for Diatom Species

No.	Species
01	Achnanthes lanceolata
02	Achnanthes minutissima
03	Achnanthes sp.
04	Amphiprora paludosa
05	Amphiprora sp.
06	Amphora ovalis
07	Amphora sp.
08	Anomoeoneis exilis
09	Asterionella formosa
10	Bacillaria paradoxa
11	Biddulphia laevis
12	Caloneis amphisbaena
13	Caloneis sp.
14	Ceratoneis arcus
15	Cocconeis pediculus
16	Cocconeis placentula
17	Cocconeis sp.
18	Coscinodiscus rothii
19	Coscinodiscus (brackish)
20	Coscinodiscus sp.
21	Cymatopleura solea
22	Cymatosira belgica
23	Cyclotella atomus
24	Cyclotella comta
25	Cyclotella kutzingiana
26	Cyclotella meneghiniana
27	Cyclotella pseudostelligera
28	Cyclotella stelligera
29	Cyclotella striata
30	Cyclotella sp.
31	Cymbella ventricosa
32	Cymbella tumida
33	Cymbella sp.
34	Denticula sp.
35	Diatoma elongatum
36	Diatoma vulgare
37	Diatoma sp.
38	Diploneis smithii
39	Diploneis sp.
40	Epithemia turgida
41	Epithemia sorex
42	Epithemia sp.
43	Eunotia sp. (first)
44	Eunotia sp. (second)
45	Fragilaria capucina
46	Fragilaria construens
47	Fragilaria crotonensis
48	Fragilaria pinnata
49	Fragilaria sp.
50	Frustulia sp.
51	Gomphonema olivaceum
52	Gomphonema sp.
53	Gyrosigma kutzingii
54	Gyrosigma sp.
55	Hantzchia amphioxys
56	Melosira ambigua
57	Melosira distans var. alpigena
58	Melosira granulata
59	Melosira binderana
60	Melosira islandica
61	Melosira italica
62	Melosira varians
63	Meridion circulare
64	Navicula cryptocephala
65	Navicula sp. (first)
66	Navicula sp. (second)
67	Nitzschia acicularis
68	Nitzschia tryblionella
69	Nitzschia denticula
70	Nitzschia (Lancelolatae group)
71	Nitzschia sp. (first)
72	Nitzschia sp. (second)
73	Opephora martyi
74	Pinnularia sp.
75	Pleurosigma delicatulum
76	Rhoicosphenia curvata
77	Rhizosolenia eriensis
78	Rhopalodia gibba
79	Rhopalodia sp.
80	Stephanodiscus astraea var. minutula
81	Stephanodiscus dubius
82	Stephanodiscus hantzschii
83	Stephanodiscus niagarae
84	Stephanodiscus sp.
85	Surirella brightwelli
86	Surirella ovata
87	Surirella striatula
88	Surirella sp.
89	Synedra acus
90	Synedra pulchella
91	Synedra nana
92	Synedra ulna
93	Synedra vaucheriae
94	Synedra sp.
95	Tabellaria fenestrata
96	Tabellaria flocculosa
97	Any entity not found above (first)
98	Any entity not found above (second)
99	Reserved for future entity
xx	Insignificant or population inadequate

PLANKTON POPULATION

Identification Codes of Microinvertebrate Genera and Count Levels of Most Abundant Genera

Genera of ROTIFERS
Key to counts per liter

1 5 to 10
2 11 to 20
3 21 to 40
4 41 to 80
5 81 to 160
6 161 to 320
7 321 to 640
8 641 to 1,680
9 1,681 and over

Genera of CRUSTACEA
Key to counts per liter

1 3 to 5
2 6 to 10
3 11 to 20
4 21 to 40
5 41 and over

Code to
MICROINVERTEBRATES

Rotifers

01 Asplanchna
02 Brachionus (also Platyias)
03 Collotheca
04 Cephalodella
05 Chromogaster
06 Euchlanis
07 Filinia
08 Gastropus
09 Hexarthra (also Pedalia)
10 Kellicottia
11 Keratella
12 Lepadella
13 Monostyla (also Lecane)
14 Notholca
15 Philodina and similar contracted bdelloids
16 Ploesoma
17 Polyarthra
18 Pompholyx
19 Proales
20 Rotaria
21 Synchaeta
22 Trichocerca
23 to 45 Reserve
46 Other genus
47 Other genus
48 Other genus
49 Other genus

Cladocerans

50 Nauplii
51 Bosmina and related genera
52 Daphnia and related genera
53 Moina
54 Polyphemus
55 to 72 Reserve
73 Other genus
74 Other genus
75 Other genus

Copepods

76 Cyclops,Euclops, and Paracyclops
77 Diaptomus
78 to 97 Reserve
98 Other genus
99 Other genus

Blank—Insignificant or population inadequate

ORGANIC CHEMICALS

Although units of concentration may be assigned to the values reported herein (µg/l or parts per billion), it is essential that the user of these data consider additional associated information. Introspective examination of the data reported herein has indicated that comparison of concentration values obtained from samples of similar gallonage are more valid than samples of widely differing gallonage. In addition, recent experimental researches have shown that lower flow rates and lower sample volumes than those employed (5,000 gallons at 0.5 gpm) are substantially more efficient and should produce relatively higher concentration values with this method. The first in a series of changes designed to increase sampling efficiency is already underway at Water Pollution Surveillance System stations.

Concentration values reported for specific substances are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE. In light of an unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.

Zeros when reported have been entered. A dash indicates that the respective results were not reported. An asterisk in the column showing end of sample date indicates that the determinations are for composited samples taken on and before the date shown. The extent of compositing can be determined by examining the gallons filtered, which is the sum of the applicable individual samples immediately above it.

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

The data entered in each column are as reported. Concentrations of alkalinity and hardness are reported in milligrams per liter as $CaCO_3$. A dash signifies that the particular test was not performed. Zeroes when meaningful have been entered. An asterisk preceding a number should be read as "less than" the number following it.

TRACE ELEMENTS AND OTHER DETERMINATIONS

For a discussion of the sensitivity limits of the determinations performed with spectrographic methods, see page 11.

BASIN 1

NORTHEAST

The Northeast basin is drained by many rivers. The basin includes all of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut and most of New York. The region is generally mountainous to hilly with local coastal and interior plains. Oceanic and continental climates prevail in which average annual precipitation varies from 40 to 48 inches along the coast to approximately 30 to 38 inches in the interior. Corresponding summer temperatures are 65° to 68° F. and 60° to 65° F. Winter temperatures average from 24° to 28° F. along the coast and 14° to 20° F. inland. Eight Water Pollution Surveillance System stations are located on six rivers.

Merrimack River: This river begins in the White Mountains of New Hampshire and flows southward until it enters Massachusetts where it then turns eastward to discharge into the Atlantic Ocean. The upper portion of the basin is underlain by well-weathered granites and gneiss. Rainfall averages about 42 inches over the basin with some variation due to elevation. The total drainage area is approximately 5,000 square miles and the river length is 110 miles.

Connecticut River: The Connecticut River is west of the Merrimack River and drains 11,300 square miles. The river has its headwaters in the granites of the White and Green Mountains of New Hampshire and Vermont and flows south for 400 miles to discharge into the Atlantic Ocean. The average annual precipitation varies from 44 inches per year in the south to 38 inches per year near the headwaters. The basin consists of granites in the headwaters merging into sandstones and shales in the lower reach.

Hudson River: The headwaters of the Hudson River are in the Adirondack Mountains of northern New York. The river flows for 300 miles, of which the lower 100 are tidal, and discharges into the Atlantic Ocean. The principal tributary to the Hudson is the Mohawk River which flows easterly across the central part of the State and is confluent to the Hudson at Troy, N.Y. The total drainage area is about 13,000 square miles. Precipitation varies from 35 to 45 inches per year with the higher values occurring in the mountains. Annual snowfall averages about 88 inches in the Adirondacks.

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Raritan River: The Raritan River begins in central New Jersey and flows eastward to discharge into Raritan Bay. The Water Pollution Surveillance System station is located in the tidal zone of this river. Precipitation in the Raritan basin is about 45 inches per year with about 30 inches per year of snow.

Niagara River: This river discharges water from Lake Erie to Lake Ontario. The most outstanding feature of this river is Niagara Falls with a drop of about 160 feet. There is extensive hydroelectric development on this river.

St. Lawrence River: This stream originates at the outflow from Lake Ontario and flows northeastward to discharge into the Gulf of St. Lawrence. The river is tidal below Quebec.

Phytoplankton counts at stations in the Northeast basins are usually less than 10,000/milliliter, except at Enfield Dam on the Connecticut River and Raritan Bay. In Raritan Bay, the coccoid green algae, *Nannochloris atomus*, remained in bloom most of the summer, reaching a maximum population of 172,900/milliliter, September 30, 1963.

Diatoms are generally dominant, but the green algae *Scenedesmus*, *Ankistrodesmus*, *Chlamydomonas*, *Actinastrum*, and *Micractinium* become abundant during the summer months at all stations except Buffalo and Massena.

Pennates are the dominant diatom forms throughout the year at Wilder on the Upper Connecticut and Lowell on the Merrimack, while centrics dominate throughout the year at Poughkeepsie on the Hudson River, and at Raritan Bay. The more abundant pennates include *Achnanthes minutissima*, *Synedra ulna* (especially at Lowell), *Ceratonus arcus*, *Fragilaria* spp., and *Tabellaria fenestrata* (at Massena). The abundant centric forms are *Cyclotella pseudostelligera*, *Melosira ambigua*, *M. granulata*, and *Skeletonema* (at Raritan Bay). Rotifer and microcrustacea populations are usually less than 100/liter.

CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT

This is the terminal surveillance station on the Connecticut River and is 8 miles below the Connecticut-Massachusetts State line. Samples are collected at the dam. Many of the larger Massachusetts communities treat their sewage before discharge. There are several small cities which do not.

Broad leaf tobacco and truck gardening are the agricultural activities.

The chlorinated hydrocarbon pesticide, dieldrin, has been identified in a carbon adsorption method sample from this station.

736-492 O - 64 - 3

Station Location:	Connecticut River at Enfield Dam, Connecticut
Major Basin:	Northeast
Minor Basin:	Connecticut River
Station at:	42° 00' Latitude 72° 36' Longitude
Miles above mouth:	63
Activation Date:	July 16, 1962
Sampled by:	Connecticut Water Resources Commission
Field Analysis by:	Connecticut Water Resources Commission (Wesleyan University)
Other Cooperating Agencies:	Connecticut Light and Power Company
Hydrologic Data:	
Nearest pertinent gaging station:	at Thompsonville, Connecticut
Gaging station operated by:	U. S. Geological Survey
Drainage area at gaging station:	9,661 square miles
Period of record:	1928 to present
Average discharge in record period:	16,480 cfs

Maximum discharge in record period: 282,000 cfs

Minimum discharge in record period: 1,060 cfs (daily)

Remarks: Flows affected by operations of power plants, ponds, lakes, reservoirs, and diversions into other basins. Average discharge adjusted for storage and diversion.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
1-23-63	0.11
3-20-63	0.07
4-4-63	0.11
4-17-63	0.03
5-1-63	0.03
5-22-63	0.05
5-29-63	0.07

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.10	.10
	Na	3.0	3.7
	K	1.6	.8
Analysis by Spectro-graphic methods. Results in micrograms per liter	Zn	220	50
	Ca	*1	*1
	As	*9	*7
	B	15	41
	P	35	*7
	Fe	220	6
	Mo	*1	*4
	Mn	.4	*1
	Al	-	7
	Be	*.02	*.02
	Cu	19	18
	Ag	*.2	*.2
	Ni	*1	*1
	Co	*2	*1
	Pb	*4	*2
	Cr	*1	*2
	V	*1	*4
	Ba	28	17
	Sr	38	23

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.0	.2	April to June	—	—
January to March	—	—	July to September	2.5	.3

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
8/6 - 8/20/63	Dieldrin	0.023

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE CONNECTICUT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT 82

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA								GROSS ACTIVITY	
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL		DATE OF DETERMINATION		ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	3	62	11	1	0	0	0	1	0	1	4	6	11	8	15	10						
10	10	62	11	30	0	1	0	0	0	1	2	5	4	5	6	7						
10	17	62	11	15	0	0	0	0	0	0	7	5	16	6	23	8						
10	24	62	11	20	0	0	0	0	0	0	17	6	28	6	45	8						
10	31	62	11	23	-	-	-	-	-	-	40	12	4	10	44	15						
11	7	62	11	27	0	1	1	1	1	1	9	6	8	7	17	9						
11	19	62	12	28	0	1	0	0	0	1	5	6	16	6	21	8						
11	21	62	12	18	0	1	0	1	0	1	12	6	20	6	32	8						
11	28	62	12	13	0	0	0	0	0	0	4	6	21	7	25	9						
12	5	62	1	2	0	0	0	0	0	0	5	4	13	4	18	6						
12	12	62	1	7	0	0	0	1	0	1	13	4	25	4	38	6						
12	19	62	1	7	1	1	0	1	1	1	5	4	18	4	23	6						
12	26	62	1	11	0	0	0	1	0	1	7	5	19	5	26	7						
1	9	63	1	23	0	0	0	0	0	0	21	7	11	6	32	9						
1	16	63	2	1	0	1	0	0	0	1	12	5	32	6	44	8						
1	23	63	2	14	0	1	0	1	0	1	14	6	30	7	44	9						
1	30	63	2	19	0	0	1	1	1	1	5	6	17	7	22	9						
2	6	63	2	18	0	0	0	0	0	0	0	4	28	4	28	6						
2	27	63	3	14	0	0	0	1	0	1	0	8	0	8	0	11						
3	6	63	3	27	0	0	0	0	0	0	7	6	15	6	22	8						
3	20	63	4	1	1	1	0	1	1	1	80	4	60	4	140	6						
4	17	63	6	5*	1	1	0	0	1	1	14	7	14	6	28	9						
5	29	63	6	21*	0	1	0	1	0	1	12	4	19	4	31	6						
6	5	63	7	30	0	1	0	0	0	1	6	6	8	6	14	8						
7	24	63	9	16*	0	1	0	1	0	1	17	3	23	3	40	4						
8	28	63	10	4*	1	1	0	1	1	1	9	6	26	7	35	9						
9	25	63	11	6*	0	0	0	1	0	1	9	6	15	7	24	9						

PLANKTON POPULATION

STATE CONNECTICUT
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT 082

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH		OTHER SPECIES PERCENT		PROTOZOA (Flagellates) Number per ml.	ROTIFERS														CRUSTACEA								
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)												NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)						NEMATODES (Roundworms) Number per liter	OTHER ANIMAL FORMS (Number per liter)
															1ST		2ND		3RD		4TH		5TH				1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT					GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL			GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	10	62	56	37	2	12	92	6	31	5	40	-	-	0											2							0	0
11	5	62	92	18	56	13	2	6	47	6	57	60	-	0											1							0	0
11	21	62	92	13	56	12	2	8	66	7	60	-	-	3											0							0	0
11	28	62	92	15	56	12	14	7	45	5	61	20	0	12	11	2									0							0	0
12	12	62	2	29	14	5	46	5	31	5	56	40	-	2											0							0	0
1	2	63										-	-	1											0							0	0
1	16	63	92	12	2	11	46	7	93	7	63	-	-	1											0							0	0
2	6	63	14	50	2	9	37	7	82	5	29	-	-	1											0							0	0
2	27	63	82	21	14	17	2	8	26	7	47	-	-	0											0							0	0
3	6	63	14	32	92	12	31	8	37	7	41	-	-	2											0							0	0
3	20	63	14	22	92	9	97	7	2	5	57	-	-	-											0							0	0
4	3	63	2	33	92	14	33	6	93	5	42	-	-	0											0							0	0
4	17	63	14	51	92	6	2	5	93	5	33	-	-	0											0							0	0
5	1	63	14	24	2	18	92	13	82	5	40	-	-	-											0							0	0
5	15	63	82	65	9	16	57	5	92	4	10	-	-	-											-							-	-
6	5	63	27	33	95	18	92	15	56	10	24	-	-	-											-							-	-
6	25	63	27	49	56	16	47	15	26	5	15	-	-	-											-							-	-
7	3	63	61	38	47	28	27	18	95	7	9	-	-	-											-							-	-
7	17	63	56	35	58	15	9	11	27	11	28	-	-	-											-							-	-
8	7	63	56	47	58	19	27	12	82	5	17	-	-	-											-							-	-
8	20	63	56	49	27	25	58	11	95	3	12	-	-	-											-							-	-
9	4	63	56	71	27	9	58	9	26	2	9	-	-	-											-							-	-
9	18	63	56	55	9	13	27	11	28	9	12	-	-	-											-							-	-

PLANKTON POPULATION

STATE CONNECTICUT
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT 62

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	10	62	4500	0	0	80	0	40	0	810	3560	250	540	73	3	69	2	92	2	81	2	77	2	87	2	68	1	88	1				
11	5	62	400	0	0	0	0	0	0	40	310	40	0																				
11	21	62	100	0	0	0	0	0	0	20	50	0	30																				
12	12	62	00	0	0	0	0	0	0	30	20	20	30																				
1	2	63	500	0	0	0	0	0	0	0	480	0	200	73	1																		
1	16	63	00	0	0	20	0	0	0	0	20	20	20																				
2	6	63	100	0	0	0	0	20	0	0	20	0	50																				
2	27	63	200	0	0	0	0	0	0	0	80	0	50																				
3	6	63	00	0	0	0	0	30	140	30	10	140	40																				
3	20	63	00	0	0	0	0	10	10	0	0	40	0																				
4	3	63	900	0	0	60	0	40	170	40	610	150	630	73	1	65	1																
4	17	63	100	0	0	0	0	0	0	20	110	0	200																				
5	1	63	400	0	0	20	0	20	0	0	370	0	40	97	1	73	1																
5	15	63	500	0	0	0	0	40	40	60	360	40	250	92	1																		
6	5	63	6100	0	70	460	0	4580	70	460	510	150	240	51	5	68	2	65	1	92	1	38	1	25	1	93	1						
6	25	63	13200	20	1610	2190	0	700	90	7660	970	1330	320	68	6	16	4	69	3	51	3	34	3	38	2	77	2	92	2	25	2	24	1
7	3	63	7900	40	20	4400	0	130	230	2820	310	680	210	24	4	69	3	34	3	63	3	68	3	37	2	33	2	25	1	41	1		
7	17	63	9200	20	20	4640	0	330	260	2950	920	810	240	68	4	24	4	38	3	69	3	32	3	26	2	34	2	71	2	51	2	37	1
8	7	63	29500	310	20	21060	0	460	90	6270	1280	1580	420	34	6	24	5	68	5	38	4	69	4	32	4	31	4	25	3	37	2	51	2
8	20	63	5900	130	20	2800	0	170	150	2020	600	800	600	69	4	38	3	68	2	31	2	24	2	34	2	44	1	45	1	37	1	25	1
9	4	63	17500	20	4840	7640	0	930	70	3440	560	1460	390	15	6	24	5	69	4	68	4	34	3	38	3	51	3	37	2	31	2	25	1
9	18	63	12900	200	900	7340	0	470	0	3060	900	1260	500	34	5	68	4	69	4	15	3	24	3	38	3	51	2	77	2	25	1	37	1

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE CONNECTICUT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT 82

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLOROFORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGENATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	3	62	10	10	4200	276	112	164	1	20	53	7	5	41	0	16	9	2	11
11	7	62	11	21	3141	340	132	208	3	30	55	6	5	42	0	24	11	3	8
12	12	62	12	26	3038	364	188	176	8	34	62	7	6	48	1	38	15	4	27
7	11	63	7	17	2969	310	162	148	6	42	53	5	5	42	1	20	19	5	17
8	6	63	8	20	4400#	253	141	112	3	24	60	11	8	38	3	19	14	4	17
9	10	63	9	18	3180	291	122	169	9	27	34	5	4	24	1	15	15	4	18

ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE CONNECTICUT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT 82

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (Platinum units)	TURBIDITY (Silica units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	3	62	16.0	6.6	6.7	3.0	24	3.8	-	.3	10	32	35	-	-	25	.5	76	-
10	10	62	13.0	9.3	6.6	2.4	25	4.4	-	.5	11	25	35	-	-	20	.4	72	-
10	17	62	14.0	8.2	6.6	2.0	23	5.2	10.8	.3	8	25	33	-	-	20	.2	62	-
10	24	62	11.0	7.1	-	2.1	23	5.2	11.0	.5	-	-	-	-	-	20	.2	80	-
10	31	62	9.0	9.0	7.0	3.0	25	3.7	11.0	.2	8	32	32	-	-	20	.4	91	-
11	7	62	5.0	11.2	6.9	1.7	22	4.0	11.9	.3	7	25	33	-	-	20	.3	64	-
11	14	62	6.0	11.0	7.1	2.5	21	-	-	-	7	24	31	-	-	-	-	60	-
11	21	62	3.5	11.5	7.0	2.6	14	3.8	7.6	.2	7	24	31	-	-	15	.4	51	-
11	28	62	2.5	12.0	7.0	2.6	13	3.5	8.3	.2	8	25	31	-	-	15	.5	69	-
12	5	62	4.0	11.9	6.9	3.0	13	3.5	7.8	.3	8	28	32	-	-	18	.3	80	-
12	12	62	.5	13.0	7.0	2.3	15	2.6	-	.2	6	23	26	-	-	18	.2	-	-
12	19	62	.5	12.7	7.2	3.3	15	1.6	7.7	.2	6	24	29	-	-	17	.3	64	-
12	26	62	.0	12.8	7.1	1.8	11	3.9	6.3	.6	6	25	34	-	-	15	.6	60	-
1	2	63	.0	12.1	7.2	2.3	15	4.3	9.6	.5	6	28	33	-	-	15	.3	41	-
1	9	63	.5	11.6	7.5	3.0	18	2.8	7.2	.6	6	32	31	-	-	17	.3	70	-
1	16	63	.1	11.7	7.8	3.1	17	1.7	7.8	.6	8	30	37	-	-	15	.5	76	-
1	23	63	.5	11.7	7.8	3.3	20	2.4	7.7	.4	8	28	34	-	-	15	.5	69	-
1	30	63	.1	11.5	7.9	3.4	21	1.1	8.7	.7	8	30	33	-	-	15	.5	63	-
2	6	63	.5	11.5	7.8	3.7	23	1.3	7.7	.3	8	26	23	-	-	16	.4	81	-
2	27	63	.1	11.0	7.7	3.4	25	-	-	.9	11	28	33	-	-	17	.5	67	-
3	6	63	1.5	10.3	7.8	3.1	23	4.1	8.9	.6	10	28	32	-	-	15	.5	72	-
3	20	63	1.7	11.5	7.6	2.6	19	4.0	7.2	.4	10	21	28	-	-	18	.3	72	-
4	3	63	4.4	12.7	7.5	1.6	23	3.1	7.8	.3	6	14	18	-	-	16	.4	46	-
4	17	63	8.3	10.8	7.4	.8	15	2.3	4.7	.2	6	18	24	-	-	14	.2	49	-
4	23	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20000
5	1	63	9.9	9.5	7.2	1.7	17	2.6	5.6	.1	5	18	25	18	-	14	.2	49	20000
5	8	63	12.4	9.6	7.2	1.8	-	-	-	-	4	18	24	18	-	-	-	44	11000
5	15	63	12.8	9.4	7.2	2.1	17	2.5	6.1	.3	5	21	24	19	8	15	.3	39	37000
5	22	63	15.6	8.9	6.9	2.0	-	-	-	.2	5	17	23	22	8	14	.2	55	15000
5	29	63	17.0	8.1	7.0	2.5	-	-	-	.2	6	19	28	18	5	14	.2	64	1800
6	5	63	21.9	7.4	7.3	3.8	20	2.5	7.3	.2	7	26	32	18	8	14	.2	67	32000
6	26	63	23.7	7.4	7.2	3.5	26	2.9	9.2	.1	7	29	34	22	15	15	.4	60	-
7	3	63	27.9	6.7	7.5	3.1	25	2.8	9.5	.2	8	48	34	25	20	14	.5	56	30000
7	10	63	22.6	7.0	7.4	3.0	-	-	-	-	8	35	36	22	20	-	-	76	40000
7	17	63	25.6	8.2	7.5	4.0	24	2.3	9.3	.2	9	37	39	22	15	16	.5	88	27000
7	24	63	26.5	6.6	7.4	4.0	-	-	-	.4	10	36	35	18	22	19	.5	79	50000
8	7	63	20.1	9.0	8.2	4.9	33	3.2	9.0	.3	9	43	38	22	25	15	.4	80	40000
8	14	63	20.4	4.7	7.9	3.6	-	-	-	.7	10	34	37	22	25	15	.5	77	100

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE CONNECTICUT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT ENFIELD DAM, CONNECTICUT

82

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
8	21	63	22.6	5.9	7.6	2.9	24	4.2	10.2	.5	9	34	38	22	25	15	.4	-	210000
8	28	63	21.5	5.9	7.6	4.0	-	-	-	.6	10	34	39	22	25	15	.4	86	1000
9	4	63	22.2	6.8	7.2	5.1	28	6.0	13.0	1.0	9	32	38	25	25	15	.7	74	40000
9	11	63	19.5	7.4	7.6	3.8	-	-	-	.2	8	33	37	-	-	15	.4	81	40000
9	18	63	19.5	6.7	7.4	3.2	-	-	-	.6	8	27	32	-	-	15	.4	79	2400
9	25	63	15.2	6.3	7.0	4.6	-	-	-	.8	8	24	28	-	-	12	.5	77	50000

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Thompsonville, Connecticut
Operated by U.S. Geological Survey

STATE Connecticut

MAJOR BASIN Northeast

MINOR BASIN Connecticut River

STATION LOCATION Connecticut River at Enfield Dam, Connecticut

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.750	15.000	11.400	7.000	8.620	5.710	58.500	27.900	9.490	2.990	5.020	2.010
2	5.530	18.200	8.500	7.600	7.580	6.010	65.100	38.600	7.250	4.370	5.320	1.150
3	4.330	22.000	6.140	7.940	5.680	5.040	76.900	42.100	5.220	4.930	3.180	2.920
4	5.240	23.900	11.600	8.920	4.140	5.050	86.400	39.100	8.100	2.770	1.830	5.840
5	7.840	21.300	13.200	7.940	6.680	7.530	84.400	32.400	9.200	2.340	2.930	6.300
6	11.900	19.200	14.800	6.820	8.110	8.300	78.000	26.000	7.410	2.220	4.530	6.610
7	16.800	17.400	28.400	7.730	7.770	9.120	65.900	23.900	6.600	1.060	5.110	4.160
8	35.000	15.300	36.500	9.090	8.620	9.310	58.500	21.800	4.430	3.550	6.100	1.750
9	44.100	14.700	31.700	8.920	7.120	8.660	53.800	23.900	1.840	6.210	6.900	2.820
10	39.500	14.100	24.900	9.020	6.120	7.170	50.200	24.800	4.040	7.510	5.310	5.550
11	31.200	19.900	20.800	9.300	5.120	7.040	47.300	26.800	6.290	7.340	2.190	5.330
12	23.800	20.300	19.500	10.300	7.600	8.850	43.300	30.100	6.850	5.250	3.010	4.890
13	20.300	19.600	18.200	9.630	7.690	9.690	38.100	29.900	8.800	2.650	3.780	4.750
14	18.300	20.500	15.800	6.750	7.770	11.500	35.700	27.100	6.300	1.010	6.540	3.620
15	17.500	19.100	10.600	8.380	7.930	11.600	37.400	25.200	5.750	2.720	7.600	1.930
16	15.000	18.700	7.180	8.650	6.610	11.300	36.400	23.400	4.600	4.210	7.100	2.410
17	11.900	18.100	7.280	7.520	4.420	10.200	36.900	20.400	6.050	4.030	5.270	4.280
18	12.100	15.400	9.780	8.110	4.970	10.700	39.600	20.400	7.590	3.120	3.490	4.820
19	10.700	12.300	11.000	8.130	6.790	11.700	43.000	24.200	7.100	3.720	3.630	5.700
20	9.760	11.700	12.500	7.710	7.850	12.600	47.700	26.600	6.370	1.570	5.920	6.860
21	7.380	13.300	15.100	8.410	7.860	13.100	50.200	24.600	6.520	1.100	5.040	5.600
22	6.410	14.100	10.900	8.380	7.600	12.800	53.300	24.200	5.600	2.310	4.210	2.340
23	9.090	16.300	6.920	8.650	7.020	11.600	53.100	23.000	3.490	2.780	3.970	2.770
24	9.860	19.100	8.850	9.780	4.320	10.600	52.900	20.800	4.460	3.600	3.020	3.710
25	9.470	18.500	9.410	9.260	4.820	11.000	48.000	19.100	6.090	4.090	2.550	3.340
26	9.760	16.600	7.690	8.000	6.010	17.600	43.200	16.800	5.800	4.030	2.690	2.400
27	9.000	14.900	8.810	6.740	6.010	35.600	38.000	12.600	4.780	1.740	5.180	2.070
28	4.790	14.200	8.720	8.130	5.400	50.600	32.000	11.100	4.710	1.020	5.550	1.420
29	5.360	13.300	8.470	8.620		60.500	27.500	12.500	3.440	2.840	5.770	2.270
30	7.260	13.300	7.470	8.600		57.500	22.400	9.780	1.640	4.730	5.760	6.780
31	9.770		9.370	7.330		56.400		8.630		4.730	4.390	

CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS

This station is immediately below the Massachusetts State line and monitors the effects of waste discharges from Vermont and New Hampshire. Samples are collected from west bank and immediately upstream from abutment of Central Vermont Railroad Bridge. The majority of upstream communities in both States do not have sewage treatment facilities and discharge raw sewage into the Connecticut River. The nearest such communities, Hinsdale, New Hampshire and Brattleboro, Vermont, discharge wastes from estimated sewered populations of 1,200 and 8,400, respectively.

Agricultural activities include dairying and potato production. There are three paper companies four miles upstream in Hinsdale, New Hampshire.

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Station Location: Connecticut River below Northfield, Massachusetts

Major Basin: Northeast

Minor Basin: Connecticut River

Station at: 42°42' Latitude 72°28' Longitude

Miles above mouth: 136

Activation Date: June 1, 1959

Sampled by: Massachusetts State Department of Public Health

Field Analysis by: Massachusetts State Department of Public Health (Amherst Laboratory)

Other Cooperating Agencies: None

Hydrologic Data:

Nearest pertinent gaging station: See remarks

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: Total 6,680 square miles

Period of record: –

Average discharge in record period: Estimated 11,200 cfs at sampling station.

Maximum discharge in record period: –

Minimum discharge in record period: –

Remarks: Flow below Northfield computed as the sum of the Ashuelot River at Hinsdale, New Hampshire plus Connecticut River at Vernon, Vermont. Periods of record 1944 to present for Connecticut River and 1907 to 1911 and 1914 to present for Ashuelot River.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
3-12-63	0.06
3-18-63	0.04
3-25-63	0.03
4- 1-63	0.03
4-15-63	0.02
5-20-63	0.04
5-27-63	0.03

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.05	.10
	Na	3.0	3.7
	K	1.5	.9
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	68	21
	Cd	1	*1
	As	*5	*5
	B	13	8
	P	49	*5
	Fe	65	5
	Mo	*1	*3
	Mn	.7	*1
	Al	–	6
	Be	*.01	*.02
	Cu	21	12
	Ag	.1	*.2
	Ni	*1	*1
	Co	*1	*1
	Pb	7	*2
	Cr	1	*2
	V	*1	*2
	Ba	12	8
	Sr	62	19

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.0	.3	April to June	1.4	.3
January to March	–	–	July to September	3.1	.6

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE MASSACHUSETTS

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS 11

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	12	13	-	-	-	-	-	-	4	7	9	7	13	10						
10	8	62	11	14	-	-	-	-	-	-	11	5	8	5	19	7						
10	15	62	12	3	-	-	-	-	-	-	10	3	12	3	22	4						
10	22	62	12	24	0	1	0	1	0	1	6	4	14	5	20	7						
10	29	62	11	26	-	-	-	-	-	-	19	4	31	5	50	7						
11	26	62	12	20*	0	0	0	0	0	0	7	5	19	5	26	7						
12	26	62	1	21*	0	1	0	1	0	1	2	3	16	3	18	4						
1	29	63	2	19*	0	0	0	0	0	0	0	6	9	6	9	8						
2	26	63	3	18*	1	1	0	0	1	1	3	3	10	3	13	4						
3	25	63	4	15*	0	0	0	1	0	1	14	3	24	4	38	5						
4	29	63	5	20*	0	1	0	1	0	1	8	3	20	3	28	4						
5	27	63	6	13*	0	0	0	1	0	1	13	6	25	7	38	9						
6	24	63	7	15*	0	0	0	1	0	1	3	3	17	3	20	4						
7	29	63	8	16*	1	2	0	1	1	2	22	9	15	6	37	11						
8	19	63	10	8*	0	0	0	0	0	0	4	5	20	7	24	9						
9	30	63	10	22*	1	1	0	0	1	1	24	5	18	4	42	6						

PLANKTON POPULATION

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS 011

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml)	MICROINVERTEBRATES																	
			1ST		2ND		3RD		4TH				ROTIFERS										CRUSTACEA							
														GENERA AND COUNT LEVEL (See text for Codes)										GENERA AND COUNT LEVEL (See text for Codes)							
														1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT		PROTOZOA (Identity/cells) Number per ml	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	HERBIVORES (Identity/cells) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	1	62	56	52	95	10	28	5	47	5	28	-	-	87	11	4	18	2	21	2	22	1			3	76	1					0	0
10	15	62	92	19	56	10	47	8	62	7	56	-	-	0											0							0	0
11	5	62	2	26	92	11	93	6	56	5	52	-	-	0											0							0	0
11	19	62	92	24	2	9	56	8	14	8	51	-	-	2											0							0	0
12	3	62	92	36	95	10	2	9	62	5	40	-	-	1											0							0	0
12	17	62	9	17	14	15	92	14	95	5	49	-	-	2											0							0	0
1	7	63										-	-	0											0							0	0
1	22	63										-	-	0											0							0	0
2	4	63	2	13	92	13	82	6	51	6	62	10	-	4											0							1	0
2	18	63	2	12	92	11	51	8	70	7	62	-	-	0											0							0	0
3	5	63	90	28	93	14	35	14	14	9	35	-	-	6											0							0	0
3	18	63	36	11	14	11	63	9	2	9	60	-	-	3											0							0	0
4	1	63	92	23	36	9	14	7	56	5	56	-	-	0											0							0	0
4	15	63										-	-	0											0							0	0
5	6	63	57	12	82	11	92	10	56	9	58	-	-	-											-							-	-
5	20	63	14	40	92	24	95	7	2	4	25	-	-	-											-							-	-
6	3	63	82	67	27	6	95	5	92	5	17	-	-	-											-							-	-
6	17	63	27	35	9	10	56	8	26	7	40	-	-	-											-							-	-
7	1	63	27	38	56	33	47	10	92	5	14	-	-	-											-							-	-
7	15	63	27	27	95	10	92	8	56	7	48	-	-	-											-							-	-
8	5	63	27	45	56	27	92	10			18	-	-	-											-							-	-
8	19	63	27	61	56	16	92	11	28	3	9	-	-	-											-							-	-
9	3	63	56	53	27	19	92	11	26	3	14	-	-	-											-							-	-
9	16	63	56	32	27	20	26	8	92	8	32	-	-	-											-							-	-

PLANKTON POPULATION

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS 11

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	1600	0	0	310	0	210	170	580	370	40	210	68	2	69	1	51	1	60	1												
10	15	62	1300	0	0	0	0	0	0	270	990	0	80																				
11	5	62	100	0	0	0	0	0	0	60	80	0	80																				
11	19	62	300	0	0	0	0	0	0	40	230	0	120																				
12	3	62	100	0	0	0	0	0	20	0	90	0	30																				
12	17	62	100	0	0	0	0	20	0	0	60	0	140																				
1	7	63	00	0	0	0	0	0	0	0	30	0	0																				
1	22	63	00	0	0	0	0	0	0	0	30	0	20																				
2	4	63	00	0	0	10	0	0	0	10	10	30	0																				
2	18	63	00	0	0	0	0	0	10	0	10	0	30																				
3	5	63	100	0	0	0	0	0	80	0	50	0	50																				
3	18	63	200	0	0	0	0	0	0	0	150	0	60																				
4	1	63	300	0	0	0	0	0	0	0	320	0	150																				
4	15	63	00	0	0	0	0	0	0	10	30	10	30																				
5	6	63	200	0	0	0	0	0	0	0	150	0	200																				
5	20	63	200	0	0	0	0	0	0	0	180	40	110																				
6	3	63	300	0	0	20	0	70	20	70	150	40	110																				
6	17	63	4500	0	130	670	0	0	110	2920	650	90	70	68	5	71	2	34	1	86	1												
7	1	63	2900	40	0	1420	0	230	20	930	290	350	100	68	3	24	2	38	2														
7	15	63	1400	0	0	540	0	100	0	540	250	150	80																				
8	5	63	1500	70	0	350	0	40	0	570	420	180	90	68	2																		
8	19	63	1700	40	0	820	0	70	0	560	170	280	130	68	2	31	2	38	1														
9	3	63	4100	0	20	1340	0	60	0	2110	540	6690	2410	69	4	68	2	38	2	92	1	25	1	37	1								
9	16	63	5100	20	90	1540	0	570	50	2260	570	1810	900	69	3	68	3	38	3	51	2	34	1	25	1								

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS 11

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
7	18	63	7	29	6410	166	93	73	2	21	41	6	3	29	3	10	8	3	8
8	12	63	8	19	4520	188	101	87	2	26	39	4	4	28	3	10	7	2	15
9	3	63	9	9	3980	192	100	92	3	25	29	1	3	25	0	12	12	2	17

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE: MASSACHUSETTS
MAJOR BASIN: NORTHEAST
MINOR BASIN: CONNECTICUT RIVER
STATION LOCATION: CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	16.0	8.0	7.1	1.5	26	3.9	8.4	.1	8	26	34	32	2	5	.1	93	2800
10	8	62	13.6	10.1	7.0	3.4	30	4.0	7.9	.1	5	26	32	35	33	7	.1	136	11000
10	15	62	12.0	9.3	7.2	4.3	30	4.4	10.3	.1	5	26	36	35	24	6	.1	115	9000
10	22	62	11.8	9.0	7.0	2.5	23	4.5	9.6	.1	7	24	36	34	7	5	.1	96	4700
10	29	62	8.6	10.3	7.2	1.6	23	4.2	9.7	.1	5	26	32	35	7	6	.1	82	960
11	5	62	6.9	11.6	7.2	1.6	24	3.9	9.7	.1	4	22	28	42	2	7	.1	86	9300
11	13	62	6.0	10.4	7.2	1.4	24	3.3	9.5	.1	4	22	30	35	5	4	.2	97	4100
11	19	62	3.2	12.3	7.0	1.3	24	4.1	8.1	.1	5	20	36	31	2	6	.1	70	4300
11	26	62	2.8	12.6	7.3	1.0	20	3.9	8.3	.1	4	26	34	32	2	7	.1	87	1600
12	3	62	2.2	13.1	7.3	1.9	23	3.2	7.7	.1	5	20	24	28	8	6	.1	77	3800
12	10	62	1.8	12.6	7.2	1.5	19	2.8	8.1	.0	3	16	26	26	7	3	.1	60	3000
12	17	62	.4	13.1	6.9	2.9	18	4.5	8.3	.1	5	20	30	27	3	4	.1	68	6100
12	26	62	.5	12.4	6.9	.9	19	4.5	8.1	.1	5	34	32	26	8	4	.0	65	1500
1	2	63	.4	12.6	7.2	.8	19	3.0	7.2	.1	6	30	40	15	4	3	.1	81	2400
1	7	63	.4	12.0	7.3	1.5	19	3.5	7.7	.1	5	30	38	15	5	4	.1	73	4800
1	15	63	.2	12.0	7.1	1.8	17	3.2	7.7	.1	7	32	40	22	5	11	.1	72	700
1	21	63	.0	11.9	7.3	1.4	18	3.7	7.7	.1	5	34	40	22	5	11	.1	77	4100
1	29	63	.6	12.1	7.3	1.1	18	4.1	9.8	.1	7	28	38	22	7	8	.1	88	3100
2	5	63	.5	12.2	6.9	1.4	17	3.9	9.6	.1	6	30	42	20	3	8	.1	88	7900
2	18	63	.5	11.4	6.9	1.2	18	3.2	7.0	.1	6	32	40	19	1	8	.1	79	2800
2	26	63	.6	11.5	6.8	1.4	17	3.2	6.9	.1	6	32	42	22	4	7	.1	97	500
3	5	63	1.0	11.2	6.8	1.7	20	4.0	8.4	.1	6	30	40	24	2	6	.1	73	4200
3	11	63	1.0	11.8	6.9	2.0	20	4.4	9.3	.2	8	32	40	21	5	9	.1	76	2100
3	18	63	1.0	11.2	6.7	1.6	21	4.3	10.7	.2	7	28	38	22	7	9	.1	80	3600
3	25	63	1.0	11.5	6.7	1.4	19	3.8	8.7	.1	7	28	34	22	3	8	.1	88	3000
4	1	63	1.6	14.6	7.2	1.8	23	3.5	8.7	.1	5	18	22	23	20	11	.1	69	3300
4	8	63	4.0	13.9	7.0	1.7	20	4.5	9.4	.1	5	20	22	22	7	5	.1	64	1300
4	15	63	6.8	12.8	7.2	1.3	16	2.8	6.6	.1	4	22	28	24	3	6	.1	79	1000
4	29	63	8.2	12.1	7.2	1.4	14	2.5	6.2	.1	4	22	26	19	7	3	.1	53	1000
5	6	63	10.6	11.2	7.0	.8	15	2.7	6.6	.1	3	20	28	22	5	3	.1	56	1000
5	13	63	11.2	10.4	7.0	1.2	15	2.5	7.0	.1	3	22	24	22	8	3	.1	54	-
5	20	63	14.8	10.2	7.0	1.7	19	2.5	6.5	.0	3	24	26	22	4	4	.1	59	-
5	27	63	15.4	9.8	7.1	1.3	13	2.5	6.2	.0	3	22	26	22	4	4	.1	60	1700
6	3	63	19.5	10.4	7.2	1.9	16	2.8	6.9	.0	6	24	28	12	7	5	.0	61	2000
6	10	63	21.2	8.7	7.2	3.0	14	2.1	6.2	.0	9	30	34	10	7	3	.0	75	2300
6	17	63	19.6	8.6	7.3	1.6	20	2.3	6.2	.1	6	27	37	12	7	4	.1	70	-
6	18	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2200
6	24	63	21.6	9.9	7.4	3.3	18	2.6	7.3	.0	7	32	36	12	12	4	.1	72	2200

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CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER BELOW NORTHFIELD, MASSACHUSETTS 11

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (Platinum units)	TURBIDITY (Silica units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	25.0	8.0	7.1	2.8	16	2.8	9.2	.0	9	34	40	12	15	9	.0	82	-
7	2	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1500
7	8	63	21.8	7.5	7.2	2.7	18	-	-	.0	12	36	42	10	12	9	.0	84	15000
7	15	63	23.8	7.2	7.3	2.2	17	2.4	6.7	.0	8	40	46	12	8	5	.0	85	1100
7	22	63	24.6	6.2	7.6	1.6	16	2.2	6.6	.0	8	40	46	10	18	3	.0	84	1000
7	29	63	28.0	6.5	7.2	.8	15	3.1	8.2	.0	8	34	42	22	12	5	.0	70	800
8	5	63	24.6	6.2	7.0	3.4	37	2.9	9.3	.3	13	40	44	11	90	5	.1	98	3000
8	12	63	24.2	6.8	7.3	2.5	31	6.2	11.1	.3	14	54	48	11	97	7	.0	-	940
8	19	63	22.2	7.5	7.3	1.1	24	2.8	6.9	.1	11	38	42	21	7	6	.1	91	4000
8	26	63	23.3	7.7	7.3	2.3	22	3.3	8.6	.0	11	36	36	22	7	7	.1	87	5900
9	3	63	21.4	7.6	7.1	3.3	23	3.3	9.6	.3	14	36	48	22	30	11	.1	123	470
9	9	63	20.8	7.4	7.1	3.3	24	6.7	10.3	.1	13	28	32	26	4	6	.1	85	1400
9	16	63	18.0	8.0	7.2	1.9	27	5.8	11.4	.2	10	30	42	30	15	10	.2	125	2000
9	23	63	15.8	7.5	7.0	2.4	67	7.4	14.1	.3	9	36	36	23	83	10	.1	97	11000
9	30	63	15.8	7.0	7.1	4.0	70	8.5	16.4	.1	8	30	38	30	81	12	.1	95	7000

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Computed Data for Vernon, Vermont
Data Supplied by U.S. Geological Survey

STATE: Massachusetts

MAJOR BASIN: Northeast

MINOR BASIN: Connecticut River

STATION LOCATION: Connecticut River below Northfield, Massachusetts

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	4.510	14.100	7.600	1.710	5.900	5.420	42.600	27.400	7.740	4.140	2.880	.259
2	3.860	18.300	1.770	5.900	3.500	4.220	49.000	34.400	.867	3.360	2.950	.378
3	4.310	19.700	8.210	6.510	1.930	2.220	63.400	32.700	5.770	3.600	.460	5.800
4	4.790	17.200	10.800	6.980	5.970	5.420	63.400	26.900	7.880	.295	.505	5.770
5	7.200	15.100	10.600	4.820	5.550	5.320	62.500	20.000	6.040	2.010	2.680	5.850
6	9.930	14.300	13.800	3.710	5.340	5.640	52.000	17.900	5.310	.571	3.510	6.190
7	24.000	13.100	23.500	6.910	5.530	5.380	44.800	17.100	4.610	.282	3.400	.358
8	38.000	10.600	22.600	7.100	5.920	5.340	40.900	19.200	.955	4.320	3.540	.280
9	35.100	10.800	18.600	6.700	3.510	4.380	37.100	18.300	.351	4.620	4.730	5.160
10	27.200	12.400	15.300	6.590	1.900	2.390	35.400	19.800	4.630	4.710	1.470	5.260
11	20.900	13.700	15.200	7.290	5.890	4.480	32.400	21.900	4.740	4.720	.275	3.320
12	17.300	15.500	14.600	6.740	4.490	6.770	27.300	23.100	6.820	3.590	2.280	3.400
13	15.700	16.100	11.800	2.780	5.300	6.750	24.700	20.800	4.510	.308	4.520	3.720
14	14.600	15.400	10.400	6.160	5.280	5.910	27.400	18.800	4.230	.285	5.120	.979
15	12.700	14.200	5.730	6.120	5.370	7.270	26.900	18.500	2.580	2.680	5.880	.233
16	10.600	14.100	2.720	5.310	3.750	5.160	27.300	16.100	.580	2.450	4.130	3.630
17	11.300	13.800	6.920	6.090	2.140	4.010	30.100	16.000	5.130	2.010	3.790	4.370
18	8.930	7.860	8.480	6.500	4.850	5.420	32.100	16.400	5.270	2.570	1.480	4.040
19	9.150	7.880	9.060	4.080	4.470	5.960	38.000	19.000	4.850	2.110	3.450	4.020
20	7.580	11.300	10.100	5.270	5.660	7.880	40.200	17.200	4.180	.274	5.090	6.480
21	2.220	10.600	8.620	5.330	6.250	7.230	44.900	17.000	4.420	.271	3.300	1.150
22	7.390	10.200	5.640	5.400	4.750	6.610	44.900	17.300	1.850	1.700	3.450	.256
23	7.770	13.500	3.830	5.590	3.450	5.320	45.600	16.000	.908	1.850	3.030	3.140
24	8.130	14.100	6.010	5.280	2.840	5.110	40.300	14.600	4.380	3.310	1.430	2.250
25	8.230	14.200	3.900	5.760	4.840	6.930	35.200	12.700	4.300	3.890	.971	2.580
26	8.170	12.100	6.590	4.550	5.030	10.200	30.600	9.560	3.790	2.430	5.440	1.170
27	5.150	10.400	6.680	3.640	5.030	20.500	25.000	8.120	4.320	.263	5.320	1.010
28	1.300	10.300	7.160	5.530	4.830	31.400	21.100	10.100	4.250	.261	5.040	.255
29	5.140	10.800	5.740	5.720		33.500	17.300	7.880	.319	2.780	5.620	3.350
30	6.870	9.520	2.830	5.010		32.200	17.700	4.670	.306	3.460	5.300	3.830
31	9.810		5.120	5.610		32.900		7.090		2.090	1.330	

Computed as sum of Ashuelot River at Hinsdale, New Hampshire plus the flow of the Connecticut River at Vernon, Vermont.

CONNECTICUT RIVER AT WILDER, VERMONT

This is the uppermost pollution surveillance system station on the Connecticut River. Samples are collected at the Wilder Dam power plant. The Connecticut River forms the boundary between Vermont and New Hampshire and subsequently flows through Massachusetts and Connecticut.

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Station Location:	Connecticut River at Wilder, Vermont
Major Basin:	Northeast
Minor Basin:	Connecticut River
Station at:	43°41' Latitude 72°18' Longitude
Miles above mouth:	186
Activation Date:	December 1, 1961
Sampled by:	New England Power Company
Field Analysis by:	U.S. Public Health Service
Other Cooperating Agencies:	New Hampshire State Water Pollution Control Commission Vermont Dept. of Water Resources
Hydrologic Data:	
Nearest pertinent gaging station:	See remarks
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	Estimated 3,400 square miles at sampling station.
Period of record:	–
Average discharge in record period:	Estimated 5,970 cfs at sampling station

Maximum discharge in record period: –

Minimum discharge in record period: –

Remarks: Flow at Wilder computed as Connecticut River at White River Junction, Vermont minus White River at West Hartford, Vermont.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.10	.05
	Na	4.0	3.0
	K	1.3	.7
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	64	16
	Cd	*1	*1
	As	*6	*5
	B	8	10
	P	31	*5
	Fe	134	15
	Mo	*1	*3
	Mn	.3	*1
	Al	–	13
	Be	*.02	*.02
	Cu	22	21
	Ag	*.1	*.2
	Ni	*1	1
	Co	*1	*1
	Pb	*3	4
	Cr	*1	*2
	V	*1	10
	Ba	12	22
	Sr	35	24

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.2	April to June	–	–
January to March	–	–	July to September	2.6	.4

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE VERMONT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT

DATE SAMPLE TAKEN			DATE OF DETERMINATION		RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
					ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	5	62	12	20	1	1	0	1	1	1	5	10	5	11	10	15						
10	11	62	11	7	0	0	0	0	0	0	3	5	14	5	17	7						
10	19	62	12	20	0	0	0	1	0	1	86	7	16	6	102	9						
10	26	62	11	21	0	0	0	0	0	0	10	6	16	7	26	9						
11	2	62	11	29	0	0	0	1	0	1	3	5	18	7	21	9						
11	9	62	12	4	0	0	0	1	0	1	7	6	18	6	25	8						
11	16	62	12	18	0	0	0	0	0	0	12	6	26	6	38	8						
11	23	62	12	21	0	0	0	0	0	0	1	6	18	6	19	8						
11	30	62	1	7	0	1	1	1	1	1	16	4	16	4	32	6						
12	7	62	1	3	0	0	0	1	0	1	6	6	12	6	16	8						
12	14	62	1	4	0	0	0	0	0	0	7	6	17	6	24	8						
12	21	62	1	15	1	1	0	0	1	1	21	7	9	6	30	9						
12	28	62	1	16	0	0	0	0	0	0	6	6	21	7	27	9						
2	25	63	3	20*	0	0	1	1	1	1	6	6	13	7	19	9						
3	28	63	4	22*	1	1	1	1	2	1	1	3	81	4	82	5						
4	26	63	6	3*	0	0	1	1	1	1	19	3	32	3	51	4						
5	31	63	6	25*	0	0	0	1	0	1	9	6	28	6	37	8						
6	28	63	8	6*	0	1	1	1	1	1	5	5	20	7	25	9						
7	26	63	9	9*	0	1	0	1	0	1	13	3	16	3	29	4						
8	30	63	10	10*	0	0	1	1	1	1	11	6	18	6	29	8						
9	27	63	11	6*	0	0	0	0	0	0	15	6	18	7	33	9						

PLANKTON POPULATION

STATE VERMONT
MAJOR BASIN NORTHEAST
MINOR BASIN CONNECTICUT RIVER
STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT

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DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	MICROINVERTEBRATES																			
			1ST		2ND		3RD		4TH				ROTIFERS												CRUSTACEA								
													PROTOZOA (Identifiable) Number per ml.	GENERA AND COUNT LEVEL (See text for Codes)											GENERA AND COUNT LEVEL (See text for Codes)						NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPEC. ES PERCENT			NUMBER PER LITER	1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	1ST		2ND		3RD			
															GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	5	62	2	21	92	19	57	12	95	5	43		-	87	11	4	10	2	15	1					6	50	1	77	1			0	0
10	19	62	92	16	2	7	57	7	65	5	65		-	48	11	3	10	1	8	1					0							0	0
11	9	62	2	28	92	9	95	7	65	2	54		-	0											0							0	0
11	23	62	92	17	2	14	51	7	31	6	56		-	9	11	1									0							0	0
12	7	62	92	37	14	11	2	9	28	4	39	20	-	9	11	1									0							1	0
12	21	62	9	27	92	14	14	11	64	7	41		-	0											0							0	0
1	4	63	2	26	92	19	64	6	71	5	44		-	10	11	1									0							0	0
1	18	63	2	17	14	16	62	13	92	10	44		-	0											0							0	0
2	8	63	2	31	31	7	80	5	92	5	52	60	-	3											0							0	0
2	21	63	2	17	63	10	14	10	92	9	54		-	3											0							0	0
3	8	63	2	22	92	15	31	7	51	6	50		-	27	11	3	15	1							0							1	0
3	22	63	2	14	92	11	14	9	31	8	58		-	0											0							0	0
4	5	63	2	15	92	10	14	9	51	7	59		-	0											0							0	0
4	19	63	2	20	14	18	31	9	92	8	45	10	-	2											0							1	0
5	10	63	2	22	92	12	31	8	14	6	52		-	-											-							-	-
5	24	63	2	22	14	13	31	8	92	6	49		-	-											-							-	-
6	10	63											-	-											-							-	-
6	21	63	92	13	56	10	27	6	95	6	65		-	-											-							-	-
7	5	63	2	9	61	8	92	7	95	6	70		-	-											-							-	-
7	19	63	95	23	61	19	2	10	91	5	43		-	-											-							-	-
8	9	63	61	16	2	9	92	8	56	7	60		-	-											-							-	-
8	23	63	27	41	92	8	26	8	28	7	36		-	-											-							-	-
9	6	63	92	18	61	14	27	9	2	8	51		-	-											-							-	-
9	20	63	2	27	92	9	27	7	26	6	51		-	-											-							-	-

PLANKTON POPULATION

STATE VERMONT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT 103

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	5	62	100	0	0	20	0	20	0	20	20	20	190																		
10	19	62	300	0	0	40	0	0	0	80	210	40	40																		
11	9	62	00	0	0	0	0	0	0	0	30	20	110																		
11	23	62	200	0	0	20	0	40	0	0	170	0	40																		
12	7	62	100	0	0	0	0	0	20	0	110	0	120																		
12	21	62	100	0	0	0	0	0	0	20	50	0	110																		
1	4	63	100	0	0	0	0	0	0	0	110	0	60																		
1	18	63	00	0	0	0	0	0	0	20	30	0	60																		
2	8	63	100	0	0	0	0	0	10	10	40	10	10																		
2	21	63	100	0	10	0	0	10	0	30	30	10	0																		
3	8	63	00	0	0	0	0	0	0	0	0	30	40																		
3	22	63	100	0	10	0	0	0	30	10	10	0	10																		
4	5	63	100	0	0	0	0	0	0	0	70	0	150																		
4	19	63	100	0	0	10	0	0	0	10	110	0	230																		
5	10	63	00	0	0	0	0	0	0	0	20	0	150																		
5	24	63	200	0	0	0	0	0	40	10	100	0	60																		
6	10	63	300	0	0	110	0	110	0	40	70	90	220																		
6	21	63	700	0	50	140	0	270	50	70	140	20	90	57	1																
7	5	63	400	0	0	20	0	230	20	110	50	20	160																		
7	19	63	400	0	60	150	0	0	40	40	60	80	20																		
8	9	63	400	0	20	250	0	0	40	60	60	0	0																		
8	23	63	2000	0	0	480	0	220	40	1080	220	20	70	68	3	51	1	24	1												
9	6	63	600	0	20	150	0	0	70	110	220	20	70																		
9	20	63	100	0	0	70	0	0	0	70	0	20	110																		

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE VERMONT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT

103

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	1	62	10	16	4850	246	62	184	1	14	18	2	2	14	0	8	4	1	16
11	2	62	11	16	5140	219	50	169	1	14	14	1	2	11	0	6	4	1	10
11	30	62	12	14	5060	250	57	193	6	12	17	2	2	13	0	6	3	2	11
1	2	63	1	16	5053	218	60	158	-	-	-	-	-	-	-	-	-	-	-
2	1	63	2	15	4940	229	74	155	4	22	17	2	2	13	0	10	7	1	13
3	1	63	3	15	4250	274	102	172	-	-	-	-	-	-	-	-	-	-	-
4	1	63	4	8	1390	647	292	355	6	76	79	15	12	46	6	41	32	3	55
5	3	63	5	20	5770	188	107	81	-	-	-	-	-	-	-	-	-	-	-
5	31	63	6	17	5280	173	80	93	5	18	23	3	2	18	0	11	7	1	15
7	1	63	7	15	5070	195	102	93	-	-	-	-	-	-	-	-	-	-	-
8	1	63	8	16	5630	186	96	90	2	27	26	2	3	21	0	11	13	1	16
9	3	63	9	20	2110#	478	182	296	-	-	-	-	-	-	-	-	-	-	-

ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE VERMONT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT

103

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
11	23	62	-	-	7.6	-	-	-	-	-	4	30	36	35	*25	15	.0	60	-
11	30	62	-	-	7.6	-	-	-	-	-	6	28	48	25	*25	14	.0	67	-
12	7	62	-	-	8.0	-	-	-	-	-	14	38	56	25	*25	17	.0	90	-
12	14	62	-	-	7.5	-	-	-	-	-	5	24	56	25	*25	18	.0	80	-
12	21	62	-	-	7.3	-	-	-	-	-	5	28	40	30	*25	13	.0	75	-
12	28	62	-	-	7.3	-	-	-	-	-	5	24	52	-	-	13	.0	70	-
1	4	63	-	-	7.7	-	-	-	-	-	8	34	60	-	*25	13	.0	75	-
1	11	63	-	-	7.6	-	-	-	-	-	7	32	44	-	*25	27	.0	70	-
1	25	63	-	-	7.3	-	-	-	-	-	7	28	44	-	*25	16	.0	60	-
2	1	63	-	-	7.4	-	-	-	-	-	6	20	48	-	*25	20	.0	84	-
2	8	63	-	-	7.4	-	-	-	-	-	5	28	48	30	*25	13	.0	70	-
2	15	63	-	-	7.3	-	-	-	-	-	4	28	40	25	*25	12	.0	60	-
2	21	63	-	-	7.2	-	-	-	-	-	10	28	36	25	*25	12	.0	60	-
3	1	63	-	-	7.5	-	-	-	-	-	4	28	48	35	*25	16	.0	100	-
3	8	63	-	-	7.6	-	-	-	-	-	6	24	76	25	*25	13	.0	66	-
3	15	63	-	-	7.2	-	-	-	-	-	8	26	40	25	*25	15	.0	75	-
3	18	63	-	-	6.6	-	-	-	-	-	6	28	44	25	*25	12	.0	95	-
3	28	63	-	-	6.5	-	-	-	-	-	9	32	48	25	*25	14	.0	89	-
4	5	63	-	-	6.1	-	-	-	-	-	7	20	40	25	*25	13	.0	53	-
4	12	63	-	-	7.3	-	-	-	-	-	5	16	36	20	*25	14	.0	65	-
4	19	63	-	-	7.2	-	-	-	-	-	6	24	36	20	*25	15	.0	47	-
4	26	63	-	-	7.0	-	-	-	-	-	3	24	29	20	*25	10	.0	56	-
5	3	63	-	-	-	-	-	-	-	-	6	28	28	20	*25	8	.0	37	-
5	10	63	-	-	-	-	-	-	-	-	10	24	28	20	*25	8	.0	63	-
5	17	63	-	-	-	-	-	-	-	-	6	20	28	10	*25	7	.0	70	-
5	24	63	-	-	-	-	-	-	-	-	7	20	28	20	*25	9	.0	53	-
5	31	63	-	-	-	-	-	-	-	-	5	26	48	20	*25	9	.0	41	-
6	7	63	-	-	-	-	-	-	-	-	6	26	32	20	*25	8	.0	63	-
6	14	63	-	-	-	-	-	-	-	-	8	26	36	20	*25	10	.0	52	-
6	21	63	-	-	-	-	-	-	-	-	7	32	52	20	*25	8	.0	75	-
6	28	63	-	-	-	-	-	-	-	-	9	28	44	5	*25	13	.0	86	-
7	5	63	-	-	-	-	-	-	-	-	6	30	48	10	*25	8	.0	65	-
7	12	63	-	-	-	-	-	-	-	-	9	28	48	10	*25	11	.0	94	-
7	19	63	-	-	-	-	-	-	-	-	6	28	40	20	*25	19	.0	64	-
7	26	63	-	-	-	-	-	-	-	-	6	24	48	20	*25	22	.0	55	-
8	2	63	-	-	-	-	-	-	-	-	3	26	46	20	*25	12	.0	72	-
8	9	63	-	-	-	-	-	-	-	-	8	24	34	25	*25	12	.0	69	-
8	16	63	-	-	-	-	-	-	-	-	7	32	38	20	*25	13	.0	70	-
8	23	63	-	-	-	-	-	-	-	-	7	26	34	25	*25	12	.0	69	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE VERMONT

MAJOR BASIN NORTHEAST

MINOR BASIN CONNECTICUT RIVER

STATION LOCATION CONNECTICUT RIVER AT WILDER, VERMONT 103

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
8	30	63	-	-	-	-	-	-	-	-	13	20	54	35	*25	10	.0	68	-
9	6	63	-	-	-	-	-	-	-	-	5	24	30	30	*25	16	.0	62	-
9	13	63	-	-	-	-	-	-	-	-	5	26	32	50	*25	15	.0	61	-
9	20	63	-	-	-	-	-	-	-	-	6	18	28	60	*25	14	.0	72	-
9	27	63	-	-	-	-	-	-	-	-	5	18	28	50	*25	10	.0	72	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Computed Data for Wilder, Vermont
Operated by U.S. Geological Survey

STATE Vermont

MAJOR BASIN Northeast

MINOR BASIN Connecticut River

STATION LOCATION Connecticut River at Wilder, Vermont

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	2.680	12.000	2.560	.460	3.700	3.600	16.600	21.200	2.180	3.090	1.860	.491
2	2.530	16.200	.412	4.320	.910	1.400	18.300	23.800	.515	2.820	2.070	1.380
3	2.740	14.700	5.340	4.120	.070	.070	23.600	21.400	4.280	2.730	.383	5.340
4	2.890	10.700	7.130	3.730	3.910	3.600	29.600	15.400	4.980	.037	.462	5.300
5	4.100	7.950	7.320	2.130	3.810	3.700	29.400	11.100	3.390	.850	2.060	4.880
6	5.780	8.790	7.360	1.540	2.810	3.990	24.300	14.500	3.240	.410	2.540	4.390
7	21.500	6.390	8.320	4.240	3.590	3.180	21.000	16.200	2.700	.037	2.150	1.020
8	28.900	7.320	9.840	4.050	2.800	3.480	18.900	14.000	1.420	3.840	2.670	.063
9	24.500	7.070	4.400	4.560	1.620	1.170	16.900	13.900	.269	3.340	3.480	5.320
10	19.100	7.740	6.290	4.260	.910	.960	16.300	14.600	2.420	3.610	.964	4.120
11	11.900	7.060	8.340	4.070	3.410	3.660	12.800	14.300	4.110	3.700	.209	3.060
12	9.310	9.700	7.020	1.770	3.310	4.360	13.400	15.100	3.110	3.310	1.950	3.790
13	10.800	9.380	6.310	.620	3.410	3.560	12.200	12.800	2.310	.097	2.830	3.110
14	9.930	9.460	4.340	4.270	3.400	3.850	11.600	12.600	2.140	.042	4.650	1.140
15	9.090	9.120	1.900	3.400	3.500	3.530	12.500	11.600	.957	1.490	4.630	.528
16	8.540	9.150	.150	4.120	1.210	1.650	15.600	11.100	.077	1.360	4.660	3.780
17	7.170	7.680	5.530	3.930	.070	.700	16.900	10.900	2.370	1.760	2.860	4.580
18	7.090	2.490	5.050	4.120	3.210	3.310	18.600	10.000	2.750	2.380	1.400	3.850
19	6.240	6.370	4.880	1.120	3.890	3.420	21.600	10.100	2.180	2.260	2.780	3.760
20	3.770	7.390	5.430	.980	3.270	3.450	24.600	8.370	2.010	.084	3.520	4.300
21	.755	6.910	5.780	3.790	3.370	3.320	27.200	9.140	2.070	.040	2.110	1.020
22	5.360	6.950	2.180	3.310	3.290	3.060	27.800	9.980	1.020	1.150	2.240	.065
23	6.140	9.350	1.410	4.030	1.900	1.410	28.600	8.680	.451	1.350	2.060	2.170
24	6.190	9.570	2.400	4.140	.350	1.270	25.100	6.190	2.940	2.320	2.120	2.010
25	5.180	7.240	.490	3.950	2.690	2.970	22.100	4.490	2.790	2.640	1.780	2.030
26	5.580	5.540	3.710	1.760	3.700	3.350	18.100	3.850	2.950	.965	5.030	1.240
27	3.120	6.430	3.530	.970	3.210	7.800	14.800	5.430	3.040	.042	4.540	.546
28	.971	7.190	3.860	3.180	3.410	11.300	11.700	5.250	3.180	.042	3.900	.070
29	3.740	6.700	2.280	3.390		12.700	10.900	5.370	.075	2.390	3.820	1.070
30	5.790	6.610	1.690	3.200		12.600	13.800	1.170	.057	3.610	3.020	1.970
31	6.640		2.000	3.100		15.000		4.860		1.830	1.550	

Computed as flow of Connecticut River at White River Junction, Vermont minus the flow of the White River at West Hartford, Vermont.

HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK

This station is located 70 miles above the mouth. Tides influence flows and surface elevations. Samples are collected at the intake of the International Business Machines Corporation plant.

Station Location:	Hudson River below Poughkeepsie, New York
Major Basin:	Northeast
Minor Basin:	Lower Hudson River
Station at:	41°39' Latitude 73°57' Longitude
Miles above mouth:	70
Activation Date:	July 7, 1958
Sampled by:	International Business Machines Corporation
Field Analysis by:	International Business Machines Corp. New York State Department of Health
Other Cooperating Agencies:	New York State Department of Health
Hydrologic Data:	
Nearest pertinent gaging station:	At Green Island, New York
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	8,090 square miles
Period of record:	1946 to present
Average discharge in record period:	13,490 cfs.
Maximum discharge in record period:	141,000 cfs.
Minimum discharge in record period:	1,270 cfs. (daily)

Remarks: Flows affected by operations of reservoirs, power plants, and navigation dams; diversion above station for New York City municipal supply.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.26	.15
	Na	13	5.9
	K	2.3	.9
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	75	47
	Cd	*2	*1
	As	*15	*10
	B	47	22
	P	*4	20
	Fe	154	63
	Mo	*2	9
	Mn	*.8	3.6
	Al	–	38
	Be	*.04	*.03
	Cu	20	10
	Ag	*.3	*.3
	Ni	*2	*1
	Co	*3	*1
	Pb	15	*3
	Cr	2	6
	V	*2	*5
	Ba	36	19
	Sr	116	78

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	3.0	.3	April to June	3.8	.4
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEW YORK

MAJOR BASIN NORTHEAST

MINOR BASIN LOWER HUDSON RIVER

STATION LOCATION HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK 18

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO	DAY	YR	MO	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO	DAY	pc/g	±	pc/g	±
10	3	62	12	17	-	-	-	-	-	-	5	4	9	5	14	7						
10	10	62	11	8	-	-	-	-	-	-	5	6	12	7	17	9						
10	17	62	11	15	-	-	-	-	-	-	3	5	14	7	17	9						
10	24	62	11	20	-	-	-	-	-	-	11	6	20	7	31	9						
10	31	62	11	26	-	-	-	-	-	-	9	3	18	4	27	5						
11	14	62	12	28*	1	1	0	1	1	1	12	6	135	9	147	11						
12	18	62	1	29*	0	0	0	0	0	0	7	7	22	7	29	10						
1	30	63	2	20*	0	1	0	1	0	1	0	7	22	8	22	11						
2	27	63	3	18*	0	0	0	1	0	1	5	3	13	3	18	4						
3	27	63	4	15*	0	0	0	1	0	1	29	3	28	4	57	5						
4	3	63	6	3*	0	1	0	1	0	1	15	3	26	4	41	5						
5	22	63	6	24*	0	1	0	1	0	1	10	3	22	3	32	4						
6	26	63	7	15*	0	1	1	1	1	1	0	6	27	4	27	7						
7	31	63	9	9*	0	1	0	1	0	1	2	3	2	3	4	5						
8	7	63	10	10	0	0	1	1	1	1	1	5	21	7	22	9						
9	12	63	10	22*	0	1	0	1	0	1	4	4	28	5	32	6						

PLANKTON POPULATION

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LOWER HUDSON RIVER
STATION LOCATION HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK 018

| DATE OF SAMPLE | | | DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes) | | | | | | | | | FUNGI AND SHEATHED BACTERIA (Number per ml) | MICROINVERTEBRATES | | | | | | | | |

PLANKTON POPULATION

STATE NEW YORK

MAJOR BASIN NORTHEAST

MINOR BASIN LOWER HUDSON RIVER

STATION LOCATION HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK 18

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	3	62	100	0	0	10	0	0	0	100	30	170	40																		
10	17	62	1500	60	40	290	0	0	0	620	500	460	120	69	2	68	1														
11	7	62	200	80	0	80	0	0	0	40	0	40	0																		
12	5	62	700	0	0	270	0	0	0	370	80	0	40	25	1	69	1														
12	19	62	100	0	0	20	0	0	20	50	50	50	30																		
1	16	63	100	0	0	0	0	0	40	70	0	130	220																		
2	6	63	100	0	30	10	0	30	0	30	0	50	40																		
2	20	63	300	0	10	0	0	0	200	100	0	80	80																		
3	6	63	200	0	0	0	0	0	90	80	80	50	80																		
3	20	63	100	0	0	0	0	20	20	20	70	110	20																		
4	3	63	400	0	20	60	0	0	60	40	250	60	230																		
5	1	63	100	0	0	0	0	20	0	40	20	20	20																		
5	15	63	800	0	0	60	0	60	210	380	110	340	210	77	1	68	1														
6	5	63	100	0	0	20	0	0	0	90	20	260	130																		
6	19	63	700	0	0	50	0	70	0	360	200	110	110	68	1	71	1														
8	7	63	500	0	0	250	0	0	0	200	70	220	120																		
9	4	63	900	0	40	450	0	70	0	300	40	170	190	38	1																
9	18	63	1000	140	50	370	20	0	0	180	200	70	20	38	1																

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LOWER HUDSON RIVER
STATION LOCATION HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK 18

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	7	62	11	17	5807	160	71	89	2	14	27	2	2	22	1	11	6	2	9
12	10	62	12	18	5099	244	62	182	1	12	27	3	3	20	1	9	4	1	8
1	10	63	1	21	6969	212	57	155	2	11	26	3	3	18	2	8	4	1	5
2	13	63	2	21	5156	242	93	149	2	16	40	5	4	28	3	12	5	3	15
3	13	63	3	21	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	1	63	5	9	5000#	201	115	86	8	34	32	3	4	24	1	13	12	1	15
6	12	63	6	20	5000#	192	104	88	10	23	27	2	2	20	3	12	14	1	17
9	20	63	9	30	5509	185	82	103	2	17	31	3	3	24	1	11	10	1	10

* FLOW UNKNOWN
\# ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE: NEW YORK
MAJOR BASIN: NORTHEAST
MINOR BASIN: LOWER HUDSON RIVER
STATION LOCATION: HUDSON RIVER BELOW POUGHKEEPSIE, NEW YORK

18

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	3	62	19.2	6.5	7.5	-	28	.4	3.2	.1	16	43	78	25	22	30	-	-	1400
10	10	62	17.9	6.9	7.5	-	26	.4	3.4	.1	12	40	77	25	40	30	-	-	2700
10	17	62	17.5	7.4	7.5	-	25	.4	3.5	.1	12	42	82	25	35	38	-	-	2000
10	24	62	16.4	7.4	7.4	1.0	25	.4	3.2	.1	10	44	82	25	30	35	-	-	400
10	31	62	14.1	7.8	7.5	.9	24	.4	3.0	.1	8	48	72	35	33	35	-	-	3100
11	7	62	11.7	8.6	7.5	2.3	28	.3	-	.1	10	42	77	25	30	35	-	-	2700
11	14	62	9.6	9.0	7.5	2.5	28	-	-	.1	8	41	75	25	33	35	-	-	2600
12	5	62	5.1	10.2	7.4	2.2	29	.8	-	.1	6	45	78	25	17	50	-	-	710
12	12	62	3.8	11.2	7.3	-	29	.8	-	.1	6	41	83	25	22	42	-	-	2000
12	19	62	3.2	10.9	7.4	-	28	.8	-	.1	6	42	78	25	18	28	-	-	1800
1	9	63	.5	11.6	7.3	2.2	28	.8	7.9	.3	4	46	90	25	28	48	-	-	1400
1	16	63	.6	11.0	7.3	2.0	28	.9	8.0	.2	6	46	80	30	21	35	-	-	1500
1	23	63	.8	10.2	7.2	2.4	28	.8	7.0	.2	6	45	78	35	11	40	-	-	5400
1	30	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6200
2	6	63	.5	-	7.0	3.0	29	.9	10.5	.1	6	47	76	25	8	40	-	-	9400
2	13	63	.7	-	7.1	3.1	42	.8	9.3	.3	6	45	65	20	9	47	-	-	5400
2	20	63	.5	-	7.2	3.0	40	1.0	11.0	.3	12	45	75	25	6	50	-	-	2300
2	27	63	.5	-	7.2	3.0	40	1.0	11.0	.3	12	45	75	25	6	50	-	-	*22
3	6	63	1.5	-	7.1	2.3	50	1.0	14.0	.5	20	42	78	15	17	55	-	-	9200
3	13	63	1.0	5.9	7.0	2.8	32	2.6	10.2	.5	30	45	79	25	18	41	-	-	3000
3	20	63	2.0	8.3	7.6	2.8	35	2.5	10.2	.5	30	22	85	10	17	25	-	-	9000
3	27	63	2.5	9.5	7.1	3.5	29	2.8	6.0	.6	20	35	65	15	20	35	-	-	2000
4	3	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1900
5	1	63	11.0	9.5	6.9	4.2	29	3.1	-	.3	16	35	64	20	31	20	-	-	-
5	8	63	13.0	9.5	7.2	2.6	21	5.1	7.5	.5	12	-	60	15	31	20	-	-	-
5	15	63	14.5	8.7	7.5	2.2	37	2.9	6.8	.4	16	35	64	10	41	25	-	-	-
6	5	63	19.5	6.0	6.7	4.3	17	5.1	6.6	.4	20	45	70	20	31	20	-	-	3800
6	12	63	19.0	5.2	7.1	2.7	21	1.2	5.9	.1	16	45	70	20	33	20	-	-	3500
6	19	63	20.5	5.2	8.5	4.2	15	-	7.0	.5	16	90	75	25	50	20	-	-	9200
6	26	63	21.5	5.5	7.1	2.8	17	2.6	7.3	.1	16	45	73	15	23	25	-	-	2000
7	31	63	26.5	4.5	7.1	1.8	17	-	-	.1	26	123	75	10	23	20	-	-	19000
8	7	63	26.0	4.5	7.1	1.8	17	-	7.2	.1	26	123	75	10	23	20	-	-	3500
8	12	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20000
9	4	63	24.0	5.8	7.3	.4	17	-	-	.1	26	53	83	10	24	20	-	-	1100
9	11	63	22.5	6.2	7.9	1.0	19	2.8	7.2	.1	36	149	89	20	31	15	-	-	4000
9	18	63	21.5	7.5	8.4	1.9	21	2.8	7.0	.1	36	58	85	10	23	25	-	-	510
9	25	63	19.0	7.5	7.8	.6	25	2.6	6.6	.1	20	50	88	25	23	15	-	-	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Green Island, New York
Operated by U.S. Geological Survey

STATE New York

MAJOR BASIN Northeast

MINOR BASIN Lower Hudson River

STATION LOCATION Hudson River below Poughkeepsie, New York

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.840	11.800	7.400	5.290	7.180	6.060	56.300	19.000	8.020	2.700	4.910	3.740
2	5.120	9.390	6.670	5.960	6.520	6.110	53.800	20.200	6.220	4.450	5.230	1.580
3	5.090	8.250	5.600	8.150	6.150	5.340	60.400	19.500	5.320	5.340	3.700	2.070
4	5.610	8.500	11.900	8.780	4.590	3.730	69.100	16.500	5.480	3.990	3.720	4.530
5	6.360	6.440	13.000	7.230	7.170	6.750	69.400	13.900	5.940	3.240	2.170	4.770
6	8.450	7.620	15.600	7.290	7.420	7.070	53.900	12.600	5.330	4.380	4.240	4.790
7	9.430	7.200	29.300	4.980	7.570	6.980	45.700	12.100	5.560	3.040	5.160	4.330
8	9.720	6.500	25.100	7.070	7.520	7.550	39.300	11.700	5.180	2.320	5.140	2.860
9	8.590	6.790	18.600	7.410	6.910	7.140	33.500	11.300	4.380	4.130	5.630	2.190
10	9.280	6.780	14.400	7.540	5.520	6.290	26.500	13.100	4.860	4.170	4.170	3.710
11	8.160	12.300	14.400	7.670	3.890	4.260	20.900	19.400	6.640	4.480	3.010	3.990
12	8.030	14.600	11.900	6.700	6.830	7.380	18.800	21.600	8.070	4.470	2.260	4.100
13	8.280	11.400	10.500	7.000	7.100	7.360	23.900	16.900	7.810	3.810	4.410	4.320
14	7.810	11.400	8.960	4.930	6.880	7.600	19.800	16.800	7.270	2.850	4.710	3.850
15	6.160	10.600	7.290	7.250	6.870	8.590	20.300	15.400	8.130	2.350	5.110	2.800
16	6.790	9.720	6.520	7.410	6.470	8.410	18.400	16.400	7.630	3.910	6.200	1.720
17	7.110	8.470	5.900	7.410	5.510	7.720	17.300	15.400	7.460	4.770	4.960	4.320
18	6.470	7.970	7.500	7.370	3.530	7.860	18.600	14.100	8.010	4.780	4.310	4.140
19	4.600	5.990	8.140	6.720	6.280	11.900	25.500	15.600	7.000	4.690	4.450	4.070
20	5.640	7.400	8.910	6.350	6.840	15.700	29.200	16.800	6.630	4.120	6.660	4.220
21	4.000	6.940	7.240	5.060	6.640	15.800	32.500	16.900	6.230	3.060	5.660	3.180
22	3.850	8.380	6.630	6.940	6.740	13.900	30.300	17.800	5.510	2.250	5.450	3.370
23	5.800	15.900	5.010	7.420	6.120	13.200	26.400	15.600	4.690	4.070	5.610	3.230
24	5.460	12.900	4.500	7.320	5.000	11.800	26.800	14.100	3.790	4.620	4.610	4.470
25	5.790	10.700	5.330	7.240	3.480	12.100	22.200	13.000	4.590	4.680	2.890	4.370
26	5.930	7.630	5.080	6.220	6.030	25.100	19.700	11.000	5.740	4.470	2.540	4.370
27	5.410	8.450	7.080	6.230	6.310	70.900	17.400	10.600	5.320	3.900	4.430	4.230
28	4.280	8.330	7.180	4.340	6.040	79.500	12.800	10.400	5.160	2.690	4.530	3.230
29	3.810	8.080	6.150	6.780		71.300	12.800	9.510	4.230	2.130	4.590	3.510
30	5.290	8.020	5.330	6.780		59.400	12.900	7.760	2.700	4.200	4.820	2.810
31	6.720		3.550	7.020		55.900		8.390		4.470	4.110	

LAKE ERIE AT BUFFALO, NEW YORK

This sampling point is at the lower end of Lake Erie and above the beginning of the Niagara River. Samples are taken from the municipal water plant intake.

Station Location: Lake Erie at Buffalo, New York

Major Basin: Northeast

Minor Basin: Lake Erie - Niagara River

Station at: 42°53' Latitude 79°00' Longitude

Miles above mouth: At lakeside, mile 46 on Niagara River

Activation Date: November 7, 1957

Sampled by: Buffalo Water Department
Erie County Health Department

Field Analysis by: Erie County Health Department

Other Cooperating Agencies: New York State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: Cleveland, Ohio (water stage only)

Gaging station operated by: U.S. Army Corps of Engineers Lake Survey

Drainage area at gaging station: –

Period of record: –

Average discharge in record period: 203,000 cfs.

Maximum discharge in record period: –

Minimum discharge in record period: –

Remarks: Average flow from several U.S. Lake Survey gages on Niagara River with period of record from 1860 to present.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
7-3-63	0.04
7-10-63	0.02
7-24-63	0.02
7-31-63	0.03
8-14-63	0.02
8-21-63	<0.02
8-28-63	<0.02
9-4-63	0.02
9-11-63	0.03
9-25-63	0.03

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.15	.10
	Na	12	11
	K	1.7	1.2
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	210	295
	Cd	5	4
	As	17	*19
	B	31	27
	P	4	*10
	Fe	84	7
	Mo	*3	11
	Mn	.8	*1
	Al	–	11
	Be	*.04	*.05
	Cu	56	37
	Ag	*.3	*.5
	Ni	*2	*2
	Co	*3	*2
	Pb	4	*5
	Cr	*1	*5
	V	*2	*10
	Ba	12	18
	Sr	126	89

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.7	.2	April to June	2.2	.3
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEW YORK

MAJOR BASIN NORTHEAST

MINOR BASIN LAKE ERIE-NIAGARA RIVER

STATION LOCATION LAKE ERIE AT BUFFALO, NEW YORK

14

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON				
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY		
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO	DAY	YR	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	3	62	11	19	1	1	1	1	2	1	15	6	3	8	18	10						
10	10	62	11	1	-	-	-	-	-	-	1	5	11	7	12	9						
10	17	62	11	8	-	-	-	-	-	-	4	5	6	7	10	9						
10	24	62	11	19	-	-	-	-	-	-	38	7	11	6	49	9						
10	31	62	11	23	-	-	-	-	-	-	23	5	12	6	35	9						
11	28	62	12	21	0	0	0	1	0	1	4	13	6	8	10	15						
12	5	62	1	23	0	0	1	1	1	1	1	6	8	8	9	10						
1	30	63	2	19*	0	0	0	0	0	0	7	6	14	8	21	10						
2	27	63	3	18*	0	0	0	1	0	1	10	3	15	4	25	5						
3	27	63	4	17*	0	1	0	1	0	1	1	6	16	7	17	9						
4	24	63	5	20*	0	0	0	0	0	0	4	3	15	4	19	5						
5	29	63	6	17*	0	0	1	1	1	1	14	3	23	4	37	5						
6	26	63	7	15*	0	1	0	0	0	1	33	3	20	4	53	5						
7	31	63	8	16*	0	0	0	1	0	1	18	6	19	8	37	10						
8	28	63	9	23*	0	1	0	1	0	1	4	3	20	4	24	5						
9	25	63	10	22*	0	1	0	0	0	1	9	4	21	5	30	6						

PLANKTON POPULATION

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LAKE ERIE-NIAGARA RIVER
STATION LOCATION LAKE ERIE AT
BUFFALO, NEW YORK 014

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml)	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH				PROTOZOA (Identifiable) (Number per ml)	ROTIFERS										CRUSTACEA								REBATORES (Identifiable) (Number per liter)	OTHER ANIMAL FORMS (Number per liter)
															GENERA AND COUNT LEVEL (See text for Codes)										GENERA AND COUNT LEVEL (See text for Codes)									
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT			NUMBER PER LITER	1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL	4TH GENUS	4TH COUNT LEVEL	5TH GENUS	5TH COUNT LEVEL	NUMBER PER LITER	1ST GENUS	1ST COUNT LEVEL	2ND GENUS	2ND COUNT LEVEL	3RD GENUS	3RD COUNT LEVEL		
10	3	62	82	25	83	17	80	13	45	10	35	-	-	234	17	5	11	4	22	3					3	50	1					0	0
10	17	62	45	26	82	19	83	14	80	10	31	-	-	112	11	4	17	4							15	76	2	52	2			0	1
11	7	62	46	28	56	28	59	18	9	6	20	-	-	363	17	6	11	6	21	1					9	51	1	52	1	77	1	0	0
11	21	62	9	23	80	15	59	12	83	10	40	290	-	5	17	1									1							0	0
12	5	62	9	32	82	19	59	13	83	12	24	50	-	122	11	4	17	4	21	1					3	50	1					0	0
1	2	63	59	29	9	27	83	20	26	6	18	-	-	-											-							-	-
1	16	63	82	93	26	2	71	2	72	2	1	-	-	0											0							0	0
2	6	63	59	38	9	32	82	13	80	10	7	10	-	9	17	1									1							0	0
2	20	63	59	24	80	23	82	18	9	15	20	70	-	2											0							0	0
3	6	63										-	-	3											0							0	0
3	20	63	82	37	59	17	9	12	80	11	23	-	-	1											1							0	0
4	1	63	82	58	95	19	27	8	9	3	12	-	-	1											2							0	0
4	17	63										-	-	0											1							0	0
5	1	63										-	-	0											1							0	0
5	15	63										-	-	-											-							-	-
6	5	63										-	-	-											-							-	-
6	19	63										-	-	-											-							-	-
8	5	63										-	-	-											-							-	-
8	21	63										-	-	-											-							-	-
9	4	63										-	-	-											-							-	-
9	18	63										-	-	-											-							-	-

PLANKTON POPULATION

STATE NEW YORK

MAJOR BASIN NORTHEAST

MINOR BASIN LAKE ERIE-NIAGARA RIVER

STATION LOCATION LAKE ERIE AT BUFFALO, NEW YORK

14

DATE OF SAMPLE			ALGAE (Number per milliliter)										MOST ABUNDANT ALGAE - Genera and Count Level per ml (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS		INERT DIATOM SHELLS		1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	3	62	500	0	40	0	0	0	0	370	80	120	40	71	1																
10	17	62	600	40	0	40	0	40	40	250	150	40	0	69	1																
11	7	62	500	0	0	0	40	80	40	120	170	40	0																		
11	21	62	300	0	0	90	0	0	20	130	90	50	50																		
12	5	62	200	0	20	20	0	0	0	60	120	0	20																		
1	2	63	300	0	20	0	0	0	0	130	180	110	20	77	1																
1	16	63	200	0	0	10	0	0	0	110	40	10	0																		
2	6	63	00	0	0	10	0	0	0	10	10	40	0																		
2	20	63	300	0	0	30	0	0	130	150	30	70	10																		
3	6	63	100	0	20	0	0	0	0	20	30	30	20																		
3	20	63	100	0	0	20	0	0	50	30	0	0	0																		
4	1	63	00	0	0	0	0	0	0	20	0	0	0																		
4	17	63	00	0	0	0	0	0	0	0	0	0	0																		
5	1	63	100	0	0	30	0	20	0	20	50	0	20																		
5	15	63	200	0	0	20	0	0	90	90	40	180	20																		
6	5	63	100	0	0	0	0	0	0	60	0	0	0																		
6	19	63	600	0	0	20	0	40	340	40	150	20	60	63	2																
8	5	63	100	0	40	40	0	0	20	0	0	20	0																		
8	21	63	300	20	20	130	0	0	0	90	20	20	110																		
9	4	63	200	20	0	70	0	0	40	40	0	40	0																		
9	18	63	200	50	0	20	0	20	20	90	50	0	50																		

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LAKE ERIE-NIAGARA RIVER
STATION LOCATION LAKE ERIE AT BUFFALO, NEW YORK

DATE OF SAMPLE BEGINNING MONTH	BEGINNING DAY	BEGINNING YEAR	END MONTH	END DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	EXTRACTABLES CHLOROFORM	EXTRACTABLES ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	CHLOROFORM EXTRACTABLES WATER SOLUBLES	CHLOROFORM EXTRACTABLES NEUTRALS TOTAL	NEUTRALS ALIPHATICS	NEUTRALS AROMATICS	NEUTRALS OXYGENATED COMPOUNDS	NEUTRALS LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	8	62	10	18	5062	154	37	117	-	-	-	-	-	-	-	-	-	-	-
11	1	62	11	9	4755	153	38	115	-	-	-	-	-	-	-	-	-	-	-
12	1	62	12	11	3743	219	46	173	-	-	-	-	-	-	-	-	-	-	-
12	1	62		*	13560	172	40	132	1	10	13	2	1	10	0	4	2	1	9
1	2	63	1	9	5062	146	28	118	-	-	-	-	-	-	-	-	-	-	-
1	28	63	2	5	4875	178	54	124	3	18	14	1	2	11	0	5	4	1	9
3	5	63	3	13	4800	173	37	136	-	-	-	-	-	-	-	-	-	-	-
4	1	63	4	10	4875	167	62	105	3	22	16	2	3	11	0	6	6	1	8
4	22	63	5	1	5002	140	42	98	-	-	-	-	-	-	-	-	-	-	-
5	14	63	5	24	4927	168	64	104	3	16	17	1	1	14	1	9	6	1	12
6	10	63	6	19	4725	164	58	106	-	-	-	-	-	-	-	-	-	-	-
7	9	63	7	17	4590	177	66	111	3	20	18	2	3	12	1	8	6	1	10
8	5	63	8	14	5220	151	49	102	-	-	-	-	-	-	-	-	-	-	-
9	3	63	9	10	4822	165	65	100	5	22	15	1	1	13	0	8	6	1	8

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LAKE ERIE-NIAGARA RIVER
STATION LOCATION LAKE ERIE AT BUFFALO, NEW YORK

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	3	62	12.0	9.4	8.4	3.1	5	.9	2.8	.0	23	88	136	0	6	21	.1	223	*40
10	10	62	18.0	8.9	8.3	1.3	15	.6	1.4	.0	23	88	134	0	5	24	.1	254	*40
10	17	62	17.0	9.0	8.3	1.1	14	.9	1.7	.0	23	88	130	0	10	25	.1	192	43
10	24	62	14.5	9.3	8.2	2.6	14	.9	1.6	.0	20	88	138	0	14	27	.1	190	40
10	31	62	12.0	10.0	8.2	2.0	15	.9	1.9	.0	23	88	140	0	20	26	.1	207	24
11	8	62	10.5	10.0	8.2	1.5	10	1.2	2.6	.0	23	88	128	0	8	28	.1	180	60
11	14	62	10.0	10.8	8.2	1.7	12	.9	1.9	.0	23	86	140	0	7	20	.1	187	*4
11	21	62	10.0	11.0	8.2	2.2	16	.8	-	.0	23	88	138	0	12	20	.1	186	20
11	28	62	9.5	11.2	8.1	1.8	13	.6	1.8	.0	23	86	142	0	9	20	.1	193	*4
12	5	62	10.0	11.2	8.2	1.1	10	.8	1.1	.0	23	86	134	0	5	20	.1	185	10
1	2	63	11.0	14.0	8.1	1.8	10	.8	1.9	.0	23	88	138	0	33	21	.1	205	*4
1	9	63	5.0	13.5	-	1.5	11	.4	1.6	.0	23	88	136	0	12	21	.1	173	-
1	16	63	2.0	13.4	8.0	1.8	9	.5	1.9	.0	23	88	138	0	12	21	.1	188	*4
1	23	63	.0	13.5	8.2	1.2	12	.1	1.7	.0	23	90	128	0	11	21	.1	197	-
1	30	63	2.0	13.0	8.0	2.0	16	.4	1.7	.0	23	92	136	0	15	21	.1	189	-
2	6	63	2.5	13.5	8.2	1.7	16	.2	1.2	.0	23	88	132	0	9	20	.1	197	-
2	13	63	3.0	13.6	8.1	1.0	15	.2	1.6	-	23	90	134	0	7	20	.0	194	-
2	20	63	3.0	13.7	8.1	1.6	14	.8	2.2	.0	23	80	130	0	6	20	.1	190	*4
2	27	63	3.0	13.0	8.0	1.5	14	1.4	2.8	.0	23	90	134	0	7	20	.1	189	*10
3	6	63	3.0	13.5	8.1	1.1	14	1.4	3.0	.0	23	86	132	0	4	22	.1	197	*4
3	12	63	3.0	13.5	8.0	1.1	13	1.4	2.4	.0	23	92	134	0	14	22	.1	185	20
3	20	63	4.0	13.5	8.0	1.9	141	.8	2.2	.0	23	90	136	0	7	21	.1	201	*10
3	27	63	3.0	13.6	8.0	3.9	14	1.4	2.4	.0	23	88	138	0	7	22	.1	183	*40
4	3	63	4.0	13.4	8.1	1.2	11	.8	1.8	.0	23	84	132	0	10	20	.1	211	20
4	10	63	4.0	13.0	8.4	1.0	15	.4	1.2	.0	20	88	132	0	9	22	.1	180	*4
4	17	63	4.0	13.0	8.1	1.5	11	.6	1.8	.0	20	84	126	0	15	20	.1	175	20
4	24	63	5.0	14.0	8.2	1.7	11	.8	2.0	.0	23	86	136	0	5	20	.1	157	10
5	1	63	5.0	12.8	7.9	3.1	15	.8	1.2	.0	20	72	120	0	10	20	.1	156	*4
5	8	63	5.0	12.0	8.1	2.2	5	.8	2.2	.0	18	80	120	0	0	20	.1	184	-
5	15	63	10.0	12.2	8.2	2.0	18	.6	1.9	.0	23	80	132	0	10	20	.1	174	-
5	22	63	12.0	11.2	8.2	1.9	19	.8	1.8	.0	23	80	134	0	11	20	.1	197	20
5	29	63	13.0	11.8	8.4	2.2	17	.9	-	-	23	84	126	0	9	21	.1	197	64
6	4	63	19.5	11.5	8.6	2.1	15	.9	2.1	-	23	86	124	0	3	22	.1	194	-
6	12	63	18.0	9.0	8.3	2.0	17	1.6	4.0	.0	23	80	126	0	15	21	.1	185	-
6	19	63	20.0	9.5	8.5	2.8	14	.9	2.9	.0	23	84	126	0	15	20	.1	187	*4
7	3	63	25.0	8.5	8.4	2.5	7	.8	-	.0	20	84	128	0	40	20	.1	214	10
7	10	63	22.5	9.0	8.2	2.0	11	.9	2.2	-	23	86	124	0	5	21	.1	194	-
7	11	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*4
7	17	63	23.0	8.0	8.4	.8	9	.7	2.7	.0	23	84	124	0	7	21	.0	169	50

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN LAKE ERIE-NIAGARA RIVER
STATION LOCATION LAKE ERIE AT
BUFFALO, NEW YORK

14

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	24	63	26.0	9.0	8.2	.8	6	1.6	2.3	.0	23	92	128	0	8	21	.1	199	230
7	31	63	25.0	8.2	8.4	.7	8	.4	1.6	.0	23	80	126	0	24	20	.0	223	*4
8	8	63	24.5	8.0	8.1	1.4	7	2.6	3.8	.2	25	80	136	0	16	20	.0	240	*40
8	14	63	21.0	7.9	8.3	1.4	4	.8	1.3	.0	23	84	126	0	2	20	.1	208	30
8	21	63	23.0	8.2	8.1	.8	7	.6	1.7	-	23	80	124	0	25	20	.1	227	4
8	29	63	23.5	7.8	8.2	1.4	16	.9	2.7	.0	25	86	130	0	35	19	.1	212	*10
9	4	63	20.0	8.4	8.3	1.0	13	.4	1.9	.0	20	84	124	0	5	20	.1	201	*4
9	11	63	22.5	8.7	8.2	1.8	12	.6	1.8	.0	23	84	136	0	15	22	.1	188	20
9	18	63	22.0	8.6	8.2	1.6	14	.4	1.7	.0	23	84	132	0	3	21	.4	205	100
9	25	63	21.0	8.5	8.3	1.1	12	.2	3.0	.0	23	88	130	0	24	21	.1	191	200

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Supplied by U.S. Army Corps of Engineers
U.S. Lake Survey

STATE New York

MAJOR BASIN Northeast

MINOR BASIN Lake Erie-Niagara River

STATION LOCATION Lake Erie at
Buffalo, New York

Day	October	November	December	January	February	March	April	May	June	July	August	September
			FLOW	DATA	NOT	APPLICABLE	---	LAKE	LEVELS	ONLY		

MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS

This Pollution Surveillance System station is six miles downstream from the New Hampshire-Massachusetts State line. Samples are collected at the new municipal water plant intake. The 1962 PHS Inventory of Municipal Waste Facilities indicates that 13 communities discharge raw sewage from a connected population of 115,000 to the river or its tributaries within 50 miles upstream. One treatment plant for 20,000 people is under construction.

There is a wool scouring mill and a poultry farm in the immediate vicinity of this station. Industry in this area includes electronics, shoe manufacturing, textiles and printing.

The Public Health Service is undertaking enforcement action in order to abate pollution on the Merrimack.

The chlorinated hydrocarbon pesticides, dieldrin and DDD, have been identified in carbon adsorption method samples from this station.

736-492 O - 64 - 6

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Station Location: Merrimack River above Lowell, Massachusetts

Major Basin: Northeast

Minor Basin: Merrimack River

Station at: 42°38' Latitude 71°22' Longitude

Miles above mouth: 42

Activation Date: January 16, 1958

Sampled by: Lowell Water Department

Field Analysis by: Lowell Water Department
Massachusetts State Department of Health (Lawrence Experiment Station)

Other Cooperating Agencies: None

Hydrologic Data:

Nearest pertinent gaging station: See remarks

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 4,075 square miles

Period of record: Merrimack River, 1923 to present; Concord River, 1936 to present

Average discharge in record period: 6,906 cfs.

Maximum discharge in record period: Not available

Minimum discharge in record period: Not available

Remarks: Flows at surveillance station computed as: flow of Merrimack River below Concord River at Lowell, Mass., minus flow of Concord River below River Meadow Brook, minus 170 cfs. estimated flow for Beaver Brook. Flow regulated by operations of power plants, reservoirs, and lakes. Diversion from 210 square miles for Boston and Worcester municipal supply.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
1-21-63	0.07
1-28-63	0.07
3-12-63	0.04
3-19-63	0.06
3-26-63	0.06
4- 2-63	0.05
4- 9-63	0.05
4-16-63	0.04
5-16-63	0.05
5-23-63	0.05
5-28-63	0.07

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.01	.25
	Na	5.0	5.0
	K	1.4	.7
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	132	75
	Cd	*1	*1
	As	*7	*5
	B	25	23
	P	122	45
	Fe	330	81
	Mo	*1	4
	Mn	8.3	1
	Al	–	68
	Be	*.02	.02
	Cu	54	25
	Ag	.3	*.2
	Ni	1	*1
	Co	*1	*1
	Pb	22	*2
	Cr	3	7
	V	*1	*3
	Ba	28	14
	Sr	58	42

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite interval	pc/l	±
October to December	.9	.2	April to June	-	-
January to March	–	–	July to September	1.6	.2

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
9/3 - 9/12/63	Dieldrin	0.016
9/3 - 9/12/63	DDD	0.006

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE MASSACHUSETTS

MAJOR BASIN NORTHEAST

MINOR BASIN MERRIMACK RIVER

STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS 19

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO	DAY	YR	MO	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO	DAY	pc/g	±	pc/g	±
11	27	62	1	2	0	0	0	0	0	0	9	4	67	5	76	6						
12	6	62	1	3	0	0	0	1	0	1	14	6	27	6	41	6						
12	10	62	1	4	0	1	0	0	0	1	115	8	49	6	164	10						
12	26	62	1	14	0	0	0	0	0	0	2	3	16	3	18	4						
1	21	63	2	6	0	1	0	1	0	1	22	7	45	7	67	10						
1	28	63	2	14	0	0	0	1	0	1	10	6	22	7	32	9						
2	5	63	2	25	0	1	0	1	0	1	8	4	31	4	39	6						
2	11	63	3	4	0	0	0	0	0	0	8	3	19	3	27	4						
2	21	63	3	17	1	1	1	1	2	1	9	6	27	7	36	9						
2	25	63	3	14	0	1	0	1	0	1	5	6	13	6	18	8						
3	5	63	3	24	0	0	0	1	0	1	4	3	15	3	19	4						
3	12	63	4	1	0	0	0	1	0	1	16	3	37	3	53	4						
3	19	63	4	8	0	0	1	1	1	1	41	6	59	6	100	8						
3	26	63	4	10	0	0	0	0	0	0	23	6	41	7	64	9						
4	30	63	5	17*	0	0	1	1	1	1	9	6	24	6	33	8						
5	28	63	6	13*	0	0	0	1	0	1	13	6	35	6	48	8						
6	27	63	7	31*	0	0	0	0	0	0	15	6	25	6	40	8						
7	30	63	9	3*	0	1	0	1	0	1	15	3	26	3	41	4						
8	20	63	10	2	0	1	1	1	1	1	16	6	26	6	42	8						
9	5	63	10	2	0	0	0	1	0	1	12	5	26	7	38	9						

PLANKTON POPULATION

STATE MASSACHUSETTS

MAJOR BASIN NORTHEAST

MINOR BASIN MERRIMACK RIVER

STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS 019

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES																							
			1ST		2ND		3RD		4TH				ROTIFERS												CRUSTACEA											
														GENERA AND COUNT LEVEL (See text for Codes)												GENERA AND COUNT LEVEL (See text for Codes)								
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT		PROTOZOA (Flagellates) (Number per ml.)	NUMBER PER LITER	1ST		2ND		3RD		4TH		5TH		NUMBER PER LITER	1ST		2ND		3RD		BENTHOS (Tubificids/Lake) (Number per liter)	OTHER ANIMAL FORMS (Number per liter)
															GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
11	27	62	64	16	36	14	2	9	92	8	53	30	-	1											0							0	0
12	10	62	92	13	2	12	52	5	47	5	65	20	-	0											0							1	0
1	14	63										-	-	0											0							0	0
1	28	63										-	-	1											1							0	0
2	11	63	61	16	9	13	46	7	28	6	58	-	-	0											0							0	0
2	28	63	46	15	61	11	93	7	31	7	60	-	-	4											0							0	0
3	12	63	61	14	46	11	92	8	47	7	60	-	-	0											0							0	0
3	19	63	51	12	31	10	27	9	92	8	61	-	-	0											0							0	0
4	2	63	92	13	2	8	51	7	31	5	67	-	-	0											0							0	0
4	11	63										-	-	1											0							0	0
4	30	63	2	9	43	7	47	7	92	6	71	-	-	0											0							0	0
5	16	63	92	43	9	7	95	7	93	6	37	-	-	-											-							-	-
6	4	63	92	54	9	16	95	9	91	4	17	-	-	-											-							-	-
6	20	63	95	49	91	15	30	5	47	4	27	-	-	-											-							-	-
6	27	63	49	20	28	17	61	11	92	8	44	-	-	-											-							-	-
7	9	63										-	-	-											-							-	-
7	30	63										-	-	-											-							-	-
8	15	63										-	-	-											-							-	-
9	5	63										-	-	-											-							-	-
9	17	63										-	-	-											-							-	-

PLANKTON POPULATION

STATE MASSACHUSETTS

MAJOR BASIN NORTHEAST

MINOR BASIN MERRIMACK RIVER

STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS

19

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
11	27	62	00	0	0	0	0	0	0	20	20	0	50																		
12	10	62	600	0	40	40	0	0	0	100	370	40	80																		
1	14	63	00	0	0	0	0	0	0	0	50	0	20																		
1	28	63	00	0	0	0	0	0	0	20	0	20	0																		
2	11	63	100	0	0	0	0	0	10	10	40	40	10																		
2	28	63	100	0	0	0	0	0	0	10	40	10	40																		
3	12	63	200	0	0	0	0	0	70	70	70	20	70																		
3	19	63	300	0	10	10	0	40	30	0	180	10	60																		
4	2	63	200	0	0	20	0	0	0	20	110	20	150																		
4	11	63	100	0	0	0	0	20	0	80	20	0	50																		
4	30	63	300	0	0	0	0	20	0	20	260	0	90																		
5	16	63	200	0	0	30	0	50	0	0	170	0	30																		
6	4	63	4400	70	260	1690	0	1910	90	110	220	70	180	51	4	24	3	17	1	34	1	25	1	26	1						
6	20	63	7300	0	50	4700	0	1760	360	430	50	50	90	31	5	51	4	57	2	63	2	25	1	34	1	68	1				
6	27	63	9400	1850	20	3390	0	2130	320	970	700	320	380	51	4	3	4	31	3	68	3	24	2	38	2	41	2	69	1	34	1	92	1
7	9	63	1300	0	0	500	0	100	0	700	0	100	0																		
7	30	63	3000	0	40	2300	0	370	210	40	40	20	80	34	4	38	2	63	1	51	1										
8	15	63	2600	650	0	1740	0	40	20	110	70	0	90	38	3	2	2	44	2	3	1										
9	5	63	2300	410	0	1040	0	520	0	140	230	90	200	51	2	3	2	38	2	34	1										
9	17	63	8600	180	0	8260	0	50	0	20	130	50	110	26	6	38	2														

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE MASSACHUSETTS

MAJOR BASIN NORTHEAST

MINOR BASIN MERRIMACK RIVER

STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS

19

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	14	62	11	24	6345	*	-	-	-	-	-	-	-	-	-	-	-	-	-
11	29	62	12	10	7094	202	76	126	2	15	33	5	4	24	0	11	5	1	9
2	6	63	2	18	5001	305	157	148	8	41	42	6	5	30	1	28	14	5	19
2	19	63	2	28	5000	287	99	188	3	20	37	6	4	26	1	17	7	2	13
3	21	63	3	29	5000#	176	74	102	2	15	30	7	5	17	1	14	4	1	8
4	4	63	4	23	10000#	101	52	49	4	14	15	3	2	10	0	6	5	1	7
5	1	63	5	14	5000	229	96	133	5	24	35	6	4	24	1	12	8	1	11
6	4	63	6	17	5032	238	113	125	9	25	40	5	3	30	2	13	11	2	13
7	2	63	7	13	5000	252	139	113	9	39	46	7	7	32	0	16	15	3	11
8	1	63	8	12	5004	353	205	148	18	39	55	6	5	41	3	32	33	2	26
9	3	63	9	12	5002	357	167	190	7	30	55	7	5	40	3	21	21	7	26

* CONTAMINATED SAMPLE
\# ESTIMATED

CHEMICAL. PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN MERRIMACK RIVER
STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS

19

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
11	27	62	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	17000
12	6	62	5.0	11.6	6.8	2.2	92	4.3	8.8	.2	–	–	–	–	–	–	–	–	36000
12	10	62	5.0	11.2	6.6	2.3	130	4.5	9.4	.1	–	–	–	–	–	–	–	–	–
12	19	62	5.0	9.7	6.6	2.2	120	4.5	8.5	.2	–	–	–	–	–	–	–	–	18000
12	26	62	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	14000
1	2	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	12000
1	7	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	18000
1	8	63	5.0	12.9	6.5	.5	180	4.1	9.8	.3	–	–	–	–	–	–	–	–	–
1	14	63	–	11.5	6.3	1.9	130	3.7	9.2	.2	–	–	–	–	–	–	–	–	–
1	15	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1700
1	18	63	–	8.9	6.1	1.9	180	4.2	9.5	.3	–	–	–	–	–	–	–	–	–
1	21	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	33000
1	28	63	5.0	8.7	6.5	1.8	12	4.5	10.1	.2	–	–	–	–	–	–	–	–	1000
2	5	63	3.9	10.4	6.4	2.3	13	4.3	9.8	.1	–	–	–	–	–	–	–	–	–
2	6	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	15000
2	11	63	3.9	9.6	6.5	.8	22	4.4	10.2	.2	–	–	–	–	–	–	–	–	29000
2	18	63	3.9	8.4	6.6	1.5	25	4.5	10.0	.3	–	–	–	–	–	–	–	–	–
2	25	63	4.0	8.2	6.6	1.7	29	5.0	10.5	.4	–	–	–	–	–	–	–	–	–
3	5	63	4.0	8.4	6.7	2.0	15	5.3	12.0	.5	–	–	–	–	–	–	–	–	–
3	12	63	4.0	10.6	6.4	3.4	26	3.7	8.6	.3	–	–	–	–	–	–	–	–	–
3	17	63	5.0	9.8	6.4	2.9	29	3.6	–	–	–	–	–	–	–	–	–	–	–
3	26	63	2.0	8.9	6.3	1.6	27	4.8	9.8	.3	–	–	–	–	–	–	–	–	–
4	2	63	4.0	11.4	6.1	1.5	19	3.3	8.1	.1	–	–	–	–	–	–	–	–	7000
4	9	63	6.0	8.3	6.7	1.3	18	3.6	8.4	.1	–	–	–	–	–	–	–	–	7200
4	16	63	6.0	8.8	6.7	4.0	26	4.2	10.6	.1	–	–	–	–	–	–	–	–	–
4	23	63	9.0	10.4	6.3	1.5	17	4.0	9.0	.1	–	–	–	–	–	–	–	–	8800
4	29	63	9.0	9.8	6.3	1.9	14	3.8	9.0	.1	–	–	–	–	–	–	–	–	7300
5	6	63	9.0	6.9	6.3	.4	14	3.9	9.4	.2	–	–	–	–	–	–	–	–	130
5	16	63	12.0	8.4	6.3	1.5	22	4.2	10.0	.1	–	–	–	–	–	–	–	–	–
5	21	63	13.0	9.1	6.2	1.5	25	5.0	10.5	.2	–	–	–	–	–	–	–	–	–
5	27	63	16.0	8.0	7.0	1.4	19	4.2	10.2	.2	–	–	–	–	–	–	–	–	7900
6	3	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	53000
6	4	63	21.0	6.6	6.4	2.3	32	5.2	11.2	.2	–	–	–	–	–	–	–	–	–
6	11	63	26.0	7.3	7.0	2.9	26	5.1	11.2	.4	–	–	–	–	–	–	–	–	10000
6	18	63	19.0	7.1	6.8	2.2	30	5.8	12.0	.3	–	–	–	–	–	–	–	–	–
6	24	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4400
6	25	63	20.0	6.6	7.1	2.8	54	6.9	13.4	.3	–	–	–	–	–	–	–	–	–
7	1	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1200
7	2	63	21.0	4.5	7.1	2.8	37	6.0	–	.4	–	–	–	–	–	–	–	–	–

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE MASSACHUSETTS
MAJOR BASIN NORTHEAST
MINOR BASIN MERRIMACK RIVER
STATION LOCATION MERRIMACK RIVER ABOVE LOWELL, MASSACHUSETTS 19

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	9	63	-	5.5	8.0	2.4	41	6.6	12.2	.4	-	-	-	-	-	-	-	-	-
7	17	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17000
7	18	63	20.0	4.8	7.0	3.2	25	6.4	12.0	.4	-	-	-	-	-	-	-	-	-
7	22	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20000
7	23	63	22.0	3.1	7.0	2.0	24	7.4	13.7	.3	-	-	-	-	-	-	-	-	-
7	30	63	26.0	3.9	6.9	2.2	35	8.6	15.8	.8	-	-	-	-	-	-	-	-	-
8	7	63	27.0	4.1	6.5	2.2	38	8.3	17.0	.4	-	-	-	-	-	-	-	-	-
8	19	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16000
8	20	63	26.0	3.4	6.8	1.6	34	8.0	16.6	.4	-	-	-	-	-	-	-	-	-
9	3	63	-	3.7	6.5	2.1	47	9.2	17.5	1.3	-	-	-	-	-	-	-	-	-
9	9	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7200
9	10	63	21.0	4.0	6.4	2.1	46	11.8	21.4	1.3	-	-	-	-	-	-	-	-	-
9	16	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3900
9	17	63	-	4.0	6.4	2.0	40	9.0	20.0	1.0	-	-	-	-	-	-	-	-	-
9	23	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2800
9	24	63	19.0	5.2	6.8	2.6	30	6.7	14.2	.5	-	-	-	-	-	-	-	-	-
9	25	63	20.0	6.6	7.1	2.8	54	6.9	13.4	.3	-	-	-	-	-	-	-	-	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Computed Data for Lowell, Massachusetts
Operated by U.S. Geological Survey

STATE: Massachusetts

MAJOR BASIN: Northeast

MINOR BASIN: Merrimack River

STATION LOCATION: Merrimack River above Lowell, Massachusetts

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	1.920	7.800	6.840	4.640	4.340	3.990	25.700	9.220	3.970	.861	1.090	.374
2	2.280	11.200	6.470	5.070	4.110	3.610	26.700	14.400	3.550	.999	1.040	.749
3	2.200	12.400	6.200	5.330	3.860	3.020	30.900	15.500	3.740	1.130	.801	1.890
4	2.070	10.700	6.160	5.380	4.580	3.840	34.200	11.700	3.430	1.090	.206	1.820
5	2.030	10.600	6.150	5.070	4.720	3.640	33.500	9.190	2.920	1.080	1.180	1.800
6	5.310	9.810	8.070	4.480	4.760	4.070	29.500	9.500	2.550	1.020	1.150	1.750
7	19.200	9.010	19.700	5.060	4.940	4.660	23.600	10.100	2.610	.637	1.170	.993
8	32.800	7.150	28.000	4.840	4.400	4.700	20.600	8.810	2.340	1.460	1.140	.225
9	31.100	6.880	23.700	5.110	4.420	5.160	19.000	7.680	1.090	1.280	1.020	1.220
10	21.700	7.200	19.400	5.120	3.960	4.420	17.800	7.600	2.150	1.520	.759	1.150
11	15.500	11.700	16.800	5.000	3.910	5.360	16.700	9.590	2.090	1.570	.055	1.100
12	12.900	17.200	14.100	5.100	3.890	5.580	15.100	9.850	2.240	1.560	1.160	1.060
13	10.700	16.200	11.100	4.850	4.300	5.540	13.500	8.940	2.280	1.130	1.260	.945
14	9.010	13.500	9.430	5.150	4.600	5.460	13.600	8.130	2.180	.467	1.260	.498
15	8.660	11.700	7.750	5.260	4.220	5.800	14.000	7.830	1.940	1.220	1.300	.112
16	7.280	10.200	7.210	5.100	3.860	5.650	13.200	7.490	.777	1.180	1.360	.856
17	6.210	9.380	7.100	4.800	3.080	5.020	12.700	6.890	2.580	1.280	1.140	.923
18	5.650	8.430	7.200	4.580	3.660	6.110	12.600	6.150	2.440	1.350	.475	1.110
19	5.410	7.640	6.880	4.140	4.260	6.810	12.600	7.200	2.360	1.330	1.270	1.230
20	4.720	6.720	7.260	4.320	4.280	7.500	13.300	11.000	2.320	.976	1.290	1.180
21	4.340	6.760	6.350	5.200	4.320	7.370	14.400	11.700	2.360	.391	1.300	.732
22	4.640	6.880	5.560	5.840	4.210	7.770	16.600	11.000	2.160	1.370	1.320	.152
23	4.760	9.410	5.360	5.540	3.840	7.100	17.000	9.980	.821	1.410	1.330	.922
24	4.800	10.800	5.210	5.470	3.380	5.950	15.500	8.720	2.080	1.410	.942	.981
25	4.610	10.200	5.340	5.180	3.740	7.340	12.500	7.060	2.000	1.450	.185	.991
26	4.640	9.060	5.610	4.660	4.070	9.900	10.800	5.960	1.800	1.400	1.250	1.020
27	4.150	7.800	6.190	3.940	4.040	16.000	9.830	5.720	1.590	.957	1.300	.962
28	3.800	7.520	5.860	4.330	3.850	24.500	8.350	5.660	1.530	.041	1.330	.599
29	5.000	6.950	5.710	4.540		28.500	7.860	4.760	1.160	.904	1.350	.226
30	4.390	6.910	4.670	4.330		28.800	7.850	3.980	.656	1.220	1.360	1.280
31	4.820		3.870	4.320		26.300		4.620		1.130	1.060	

Computed as flow of Merrimack River below Concord River at Lowell, Massachusetts, minus the flow at Concord River below Meadow Brook minus the estimated flow of Beaver Brook.

RARITAN RIVER AT PERTH AMBOY, NEW JERSEY

This station is located slightly over one mile above where the river empties into Raritan Bay and is subject to tides averaging about five feet. Samples are collected from State Highway 35 Bridge.

The Middlesex County, New Jersey Sewerage Authority, serving an estimated population of 330,900, discharges raw sewage into Raritan Bay. The city of Perth Amboy, N. J. discharges treated wastes from a connected population of 41,300 into the Raritan River.

A high population of blue-green algae (92,000/ml) occurred in the August 5 and September 3, 1963 samples indicating favorable conditions of enrichment and temperature.

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Station Location: Raritan River at Perth Amboy, New Jersey

Major Basin: Northeast

Minor Basin: New Jersey-New York Metropolitan Area

Station at: 40°30' Latitude 74°17' Longitude

Miles above mouth: 1

Activation Date: June 21, 1962

Sampled by: U.S. Public Health Service

Field Analysis by: U.S. Public Health Service

Other Cooperating Agencies: New Jersey Department of Health

Hydrologic Data:

Nearest pertinent gaging station: At Bound Brook, New Jersey

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 779 square miles

Period of record: 1903-09, 1944 to present

Average discharge in record period: 1,240 cfs.

Maximum discharge in record period: 32,100 cfs.

Minimum discharge in record period: 40 cfs. (daily)

Remarks: Records include diversion for industrial use. Municipal diversion upstream.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

** ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.77	1.10
	Na	6300	4690
	K	320	219
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	700	*40
	Cd	*40	*40
	As	*400	*400
	B	3700	5000
	P	*200	*200
	Fe	*80	*80
	Mo	*200	*200
	Mn	100	*40
	Al	–	*200
	Be	*1	*1
	Cu	*50	*40
	Ag	*10	*10
	Ni	*40	*40
	Co	*40	*40
	Pb	*100	*100
	Cr	*100	*100
	V	*200	*200
	Ba	*50	*20
	Sr	480	880

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

**Sample collected at surface.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	–	–	April to June	–	–
January to March	–	–	July to September	–	–

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

/FIVE FEET BELOW SURFACE/

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL		ALPHA		BETA	
MO	DAY	YR	MO	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	DATE OF DETERMINATION MO DAY	pc/g	±	pc/g	±
3	25	63	6	19*	0	0	0	0	0	0	12	2	12	5	24	5					
4	29	63	6	17*	0	0	2	1	2	1	9	2	10	3	19	3					
5	28	63	6	21*	0	0	2	1	2	1	3	2	20	3	23	3					
6	24	63	7	11*	0	0	3	1	3	1	5	6	24	5	29	8					
7	29	63	8	16*	0	0	2	1	2	1	1	2	13	5	14	5					
8	26	63	9	13*	0	0	4	1	4	1	0	2	12	4	12	4					
9	30	63	10	10*	0	0	3	1	3	1	4	2	13	3	17	4					

RADIOACTIVITY DETERMINATIONS

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 1238

/FIVE FEET ABOVE BOTTOM/

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
3	25	63	6	19*	1	1	3	1	4	1	33	3	12	1	45	3						
4	29	63	6	17*	1	0	2	1	3	1	6	2	10	3	16	3						
5	28	63	6	21*	0	0	4	2	4	2	7	2	15	4	22	4						
6	24	63	7	11*	0	0	2	3	2	3	0	6	24	5	24	8						
7	29	63	8	16*	0	0	2	1	2	1	0	2	15	4	15	4						
8	26	63	9	13*	0	0	3	1	3	1	0	2	10	4	10	4						
9	30	63	10	10*	0	0	3	1	3	1	2	2	10	3	12	4						

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

/FIVE FEET BELOW SURFACE/

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	25	62	10	29	2628	2752	150	2602	2	26	68	7	6	53	2	23	10	3	18
11	26	62	12	6	2402	2741	177	2564	5	35	78	10	8	60	0	21	11	4	23
1	7	63	1	14	3177	3039	118	2921	5	14	60	10	8	40	2	19	5	2	13
1	31	63	2	6	3950	1850	130	1720	4	14	68	12	9	44	3	17	4	4	19
3	8	63	3	13	3391	2268	118	2150	5	14	65	10	9	44	2	14	5	2	13
3	21	63	4	8	7920#	785	77	708	3	12	35	4	5	24	2	10	5	2	10
4	8	63	4	15	4170	1817	109	1708	3	18	58	8	7	40	3	14	4	2	10
5	1	63	5	6	2548	3214	186	3028	11	30	84	9	9	61	5	22	9	4	26
5	10	63	5	20	3121	2680	198	2482	6	40	77	8	8	55	6	26	14	6	29
6	3	63	6	10	4624	1942	228	1714	21	43	82	6	7	66	3	32	30	5	15
6	14	63	6	19	4167#	2231	155	2076	10	28	57	4	5	42	6	22	16	3	19
7	10	63	7	17	4588	2341	159	2182	10	26	57	5	7	41	4	22	14	3	27
7	26	63	8	1	3810	2742	123	2619	4	20	54	5	6	36	7	22	10	3	10
8	21	63	8	30	2720	2491	219	2272	9	39	88	10	11	60	7	31	22	3	27
8	30	63	9	6	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ALCOHOL EXTRACTABLES PRINCIPALLY SALT

ESTIMATED

* FLOW UNKNOWN

PLANKTON POPULATION

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

(FIVE FEET BELOW SURFACE)

| DATE OF SAMPLE | | | DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes) | | | | | | | | | FUNGI AND SHEATHED BACTERIA Number per ml. | MICROINVERTEBRATES | | | | | | | | |

CHEMICAL PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

(FIVE FEET BELOW SURFACE)

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	19.0	3.2	6.8	1.1	–	5.4	–	–	–	–	4050	–	–	–	–	26700	–
10	3	62	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	730
10	8	62	17.6	3.3	7.6	2.6	–	13.2	17.0	–	9100	78	3080	5	25	1300	.0	17600	570
10	15	62	–	–	7.2	1.7	–	12.0	17.1	–	11500	88	3650	5	25	1500	.1	–	260
10	22	62	16.5	3.7	7.4	1.0	–	8.8	10.1	–	9500	76	2200	5	25	1250	.1	18363	300
10	29	62	13.5	3.6	6.4	1.6	–	9.9	15.6	–	12100	90	4300	5	25	1575	.3	24500	700
11	5	62	10.8	–	7.0	1.3	–	6.8	17.4	–	14400	88	3950	5	25	1800	.0	24137	7800
11	13	62	10.3	5.6	7.3	2.7	–	5.6	–	–	10950	84	3450	5	25	1500	.1	20895	48000
11	19	62	7.5	6.3	7.0	3.2	–	11.0	15.4	–	11700	94	3650	5	25	1550	.0	21067	650
12	3	62	7.8	6.4	7.2	3.1	–	8.2	13.2	–	11000	82	3630	5	25	1700	.0	21560	750
12	10	62	3.2	6.0	7.4	3.2	–	9.1	13.6	–	8450	64	2950	5	25	190	.1	16000	1600
12	17	62	1.3	7.3	7.3	3.0	–	6.0	14.5	–	9800	74	3100	5	25	1150	.0	17000	2000
1	7	63	1.5	9.9	7.4	3.6	–	9.4	13.2	–	8550	76	2500	–	25	1300	.0	16230	150
1	14	63	1.0	8.3	7.4	2.7	–	5.8	13.5	–	12350	88	4050	–	25	1800	.0	23275	400
1	18	63	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7800
1	21	63	.0	–	7.0	3.6	–	7.0	13.2	–	5200	60	1960	–	25	800	.0	10410	
1	28	63	1.2	8.2	7.5	6.6	–	8.8	12.2	–	11300	86	3650	–	25	1400	.4	21404	4700
2	4	63	5.0	10.6	7.6	5.1	–	8.1	21.8	–	6200	60	2100	–	25	950	.0	11943	400
2	11	63	1.0	8.9	7.4	3.1	–	11.1	16.4	–	12500	90	4200	10	25	1800	.0	23540	130
2	18	63	1.0	10.1	7.2	5.2	–	9.0	16.8	–	8650	68	3850	5	25	1100	.0	16260	160
2	25	63	1.5	9.2	7.3	3.4	–	13.6	18.6	–	10350	76	3450	–	25	–	.0	19600	980
3	4	63	2.1	10.7	7.3	7.4	–	9.5	22.2	–	5100	44	2200	15	25	650	.0	9800	–
3	11	63	3.2	7.9	7.2	3.7	–	12.1	19.4	–	11000	78	3500	5	25	1600	.2	19200	–
3	18	63	–	–	6.3	2.8	–	10.8	15.7	–	4800	48	1650	10	25	550	.1	9500	400
3	25	63	4.9	–	6.5	4.5	–	13.5	20.4	–	8800	72	2900	5	25	1200	.1	16800	1000
4	1	63	10.5	–	6.5	3.6	–	10.5	19.7	–	5000	50	1700	5	25	700	.0	9000	
4	8	63	9.5	–	6.9	3.4	–	11.3	16.2	–	8100	72	2000	10	25	1140	.0	24000	2300
4	15	63	9.5	–	6.3	4.7	–	6.7	14.3	–	10200	80	3400	5	25	1440	.1	19200	4700
4	22	63	13.5	–	6.3	5.5	–	8.8	13.2	–	10000	80	3500	15	25	1440	.0	19000	500
4	29	63	15.1	9.5	7.0	5.6	–	9.0	14.7	–	11900	88	4100	10	25	1560	.0	21000	200
5	6	63	14.3	7.1	–	1.9	–	8.1	11.9	–	15500	116	4800	5	25	2000	.0	27000	500
5	13	63	15.3	6.6	7.2	2.3	–	6.3	14.6	–	11700	80	4300	10	25	1440	.1	21000	–
5	20	63	20.0	3.8	6.6	2.6	–	11.8	18.5	–	7100	54	2500	15	25	1100	.0	14000	4400
5	28	63	18.5	1.4	7.4	2.1	–	9.1	21.5	–	9100	74	3600	15	25	1450	.1	18100	–
6	3	63	20.6	3.2	7.3	2.7	–	9.2	25.9	–	9500	68	3200	10	24	1400	.1	17900	800
6	10	63	21.5	3.1	7.2	4.2	–	12.9	24.6	–	11500	80	4200	15	25	1500	.3	21000	2000
6	17	63	21.4	4.0	7.4	3.7	–	6.7	–	–	9600	72	3300	10	25	1300	.1	19400	900
6	24	63	22.5	6.7	7.3	3.0	–	15.4	22.7	–	12200	84	3900	5	25	1760	.6	23000	7400

PLANKTON POPULATION

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

(FIVE FEET BELOW SURFACE)

DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	100	40	0	40	0	0	0	0	40	0	40																		
10	15	62	300	0	0	20	0	20	0	100	100	80	20																		
11	5	62	100	0	0	0	0	0	0	40	40	0	0																		
11	19	62	300	0	0	0	0	0	0	0	290	40	40																		
12	3	62	00	0	0	0	0	0	0	30	20	20	90																		
12	17	62	100	0	0	0	0	0	0	20	80	30	30																		
1	14	63	600	0	0	0	0	0	0	480	70	20	200	67	1																
2	4	63	200	0	0	0	0	0	0	110	80	20	130																		
2	18	63	500	0	20	0	0	0	220	200	20	0	70	69	1																
3	4	63	400	0	0	0	0	0	0	210	150	60	60																		
3	18	63	900	0	0	20	0	20	0	810	70	20	90	72	3																
4	1	63	2000	0	0	40	0	70	110	1630	110	70	110	72	4																
4	15	63	4300	0	0	40	0	70	0	4140	20	900	20	72	5	71	2	67	1												
5	6	63	1100	0	0	20	0	40	40	730	290	220	150	77	2	77	1														
5	20	63	1700	0	150	400	0	0	20	360	780	210	250	77	2	24	1														
6	3	63	200	0	0	70	0	70	0	70	0	0	0																		
6	17	63	1400	260	20	70	0	20	0	1040	0	810	70	69	3	68	2	3	1	67	1	71	1								
7	29	63	5100	0	0	0	0	0	0	5010	40	330	60																		
8	5	63	93500	0	0	80	0	40	*	60	40	40	40	65	9																
9	3	63	93200	92450	0	190	0	20	240	220	40	20	20	3	9																
9	16	63	47200	46800	50	20	0	50	0	230	90	0	20	3	9																
9	30	63	174000	*	0	140	0	720	50	110	110	70	70	3	9	51	2	49	1												
8	5	63							* 93230																						
9	30	63		* 172890																											

CHEMICAL PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 1224

/FIVE FEET BELOW SURFACE/

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	1	62	15.2	3.2	6.2	1.1	-	5.4	-	-	-	-	4050	-	-	-	-	26700	-
10	3	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	730
10	8	62	17.9	3.4	7.0	2.6	-	13.2	17.0	-	9100	78	3080	5	*25	1300	*0	17600	570
10	15	62	-	-	7.0	1.7	-	12.7	17.1	-	11500	88	3650	5	*25	1500	*1	-	260
10	22	62	16.5	2.7	7.1	1.6	-	6.8	10.1	-	9500	76	3200	5	*25	1250	*1	18362	300
10	29	62	13.6	3.6	7.0	1.8	-	8.7	15.6	-	12100	90	4300	5	*25	1574	*3	24500	700
11	5	62	10.8	-	7.0	1.8	-	6.8	17.4	-	14400	88	3960	5	*25	1600	*0	24137	7800
11	13	62	10.3	5.1	7.3	2.7	-	5.6	-	-	10950	84	3450	5	*25	1500	*1	20895	48000
11	19	62	7.5	6.1	7.0	3.0	-	11.0	15.4	-	11700	84	3650	5	*25	1550	*0	21067	650
12	3	62	7.8	6.5	7.1	3.3	-	8.3	13.2	-	11200	82	3650	5	*25	1700	*0	21560	750
12	10	62	3.2	6.6	7.4	3.0	-	9.1	13.6	-	9450	66	2950	5	*25	190	*1	16000	1600
12	17	62	1.3	7.7	7.3	3.0	-	6.0	14.5	-	8800	74	3100	5	*25	1150	*0	17000	2000
1	7	63	1.5	9.3	7.4	3.4	-	9.7	13.9	-	9550	76	3800	-	*25	1300	*0	16400	150
1	14	63	1.0	8.3	7.4	2.7	-	5.3	13.5	-	12350	98	4050	-	*25	1800	*0	23096	500
1	18	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7800
1	21	63	0.3	-	7.0	3.6	-	5.0	13.9	-	5200	60	1960	-	*25	900	*0	10410	
1	28	63	1.2	8.2	7.5	6.4	-	8.8	17.0	-	11200	86	3650	-	*25	1400	*4	21424	4700
2	4	63	5.2	10.6	7.6	5.0	-	8.7	21.8	-	6700	60	2100	-	*25	950	*0	11943	600
2	11	63	1.2	9.9	7.4	3.8	-	11.1	24.4	-	12500	90	4200	10	*25	1800	*2	23540	130
2	18	63	1.0	10.1	7.5	7.8	-	9.7	16.8	-	9550	68	3450	5	*25	1100	*0	16260	160
2	25	63	1.3	9.2	7.3	3.6	-	13.6	18.6	-	10350	76	3450	-	*25	-	*0	19600	980
3	4	63	2.1	10.7	7.2	3.4	-	9.5	22.3	-	6100	46	2200	24	*24	650	*2	9800	-
3	11	63	3.2	7.9	7.0	3.7	-	12.7	19.4	-	11000	78	3500	5	*25	1600	*2	19200	-
3	18	63	-	-	6.8	2.6	-	10.6	15.7	-	4800	44	1650	10	*25	650	*1	9500	400
3	25	63	4.9	-	6.5	4.5	-	13.5	20.4	-	6800	72	2900	5	*25	1200	*1	16800	1000
4	1	63	10.6	-	6.8	3.6	-	10.5	19.7	-	5000	52	1700	5	*25	700	*0	9000	
4	8	63	9.8	-	6.9	3.6	-	11.3	18.2	-	8100	72	2900	10	*25	1140	*0	24900	2300
4	15	63	9.5	-	6.8	4.1	-	8.7	14.3	-	10200	80	3400	5	*25	1440	*1	19200	4700
4	22	63	13.5	-	6.8	5.6	-	8.8	13.2	-	10000	80	3800	10	*25	1440	*0	19000	500
4	29	63	12.1	9.6	7.0	5.0	-	8.2	14.7	-	11900	88	4100	10	*25	1560	*0	21000	200
5	6	63	14.3	7.1	-	5.0	-	8.1	11.9	-	15500	116	4800	5	*25	2000	*0	27000	400
5	13	63	15.3	6.6	7.2	7.3	-	6.8	14.6	-	12700	80	4300	10	*25	1440	*1	21000	-
5	20	63	20.0	3.8	6.8	2.6	-	11.3	12.6	-	7100	54	2500	15	*25	1100	*0	14000	4400
5	27	63	13.5	1.4	7.2	2.6	-	9.2	21.5	-	9100	76	3600	15	*25	1450	*1	18400	-
6	3	63	20.6	3.2	7.3	2.2	-	6.2	28.9	-	9500	68	3200	10	*25	1400	*1	17000	600
6	10	63	21.5	3.2	7.2	4.2	-	14.3	24.6	-	11500	80	4200	15	*25	1500	*2	21000	2000
6	17	63	21.4	4.0	7.4	3.7	-	5.7	-	-	9600	72	3300	20	*25	1300	*1	18400	900
6	24	63	22.5	6.7	7.3	3.0	-	15.4	22.7	-	12300	94	3900	5	*25	1760	*6	23000	2400

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 1234

FIVE FEET FROM BRIDGE

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	26.0	6.5	7.2	4.5	-	1.6	3.0	-	11000	74	3800	15	35	1360	.1	20000	7200
7	8	63	22.0	6.4	7.4	4.4	-	1.9	5.0	-	16400	122	5500	10	25	2200	.2	29400	11000
7	15	63	25.0	5.2	-	5.1	-	6.8	12.0	-	10000	68	3700	10	25	1500	.0	19400	2000
7	22	63	25.5	4.7	6.8	2.8	-	3.9	7.4	-	12500	80	4400	5	24	1840	.5	24000	5600
7	29	63	26.8	-	6.6	3.4	-	4.2	10.3	-	11800	70	3700	15	25	1760	.2	21000	460
8	5	63	24.6	3.6	6.8	3.7	-	6.7	8.1	-	14300	93	4600	5	25	1960	.4	25000	2400
8	12	63	24.8	2.7	7.2	2.6	-	10.7	13.2	-	13900	100	4800	5	25	2400	.4	26100	2000
8	19	63	24.0	5.2	7.6	3.3	-	5.7	16.0	-	12100	80	4500	20	25	1800	.2	22300	460
8	26	63	22.5	4.7	7.0	3.0	-	4.0	7.7	-	14500	70	4700	0	25	2100	.4	27700	12000
9	3	63	21.5	5.2	7.2	3.9	-	5.6	8.2	-	13300	82	5000	0	25	2200	.4	28240	1800
9	9	63	20.8	5.8	6.6	3.6	-	4.4	9.9	-	10800	88	4800	5	25	1900	.0	26460	3000
9	16	63	17.6	5.1	7.1	2.2	-	5.4	7.6	-	13300	92	4200	10	25	2100	.1	24670	1400
9	23	63	16.0	5.3	7.2	1.8	-	1.9	6.7	-	13300	88	4500	5	25	1960	.2	25000	850
9	30	63	17.6	5.4	7.0	2.5	-	6.5	9.2	-	9100	68	3400	10	25	1520	.0	18100	2000

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123A

/FIVE FEET BELOW SURFACE/

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	26.0	6.5	7.2	4.5	-	1.6	3.0	-	11000	78	3800	15	*25	1360	.1	20000	7200
7	8	63	22.0	6.4	7.4	4.4	-	1.9	5.0	-	16400	102	5500	10	*25	2200	.3	29400	11000
7	15	63	25.0	5.2	-	5.1	-	6.8	12.0	-	10000	68	3700	10	*25	1500	.0	19600	2000
7	22	63	25.5	4.2	6.8	2.8	-	3.9	7.4	-	12500	80	4400	5	*25	1840	.6	24000	5600
7	29	63	26.8	-	6.5	2.4	-	4.2	10.3	-	11800	72	3700	15	*25	1760	.2	21000	450
8	5	63	24.6	3.6	6.8	3.2	-	6.7	8.1	-	14300	90	4600	5	*25	1960	.6	25000	2400
8	12	63	24.8	2.7	7.2	2.6	-	10.7	13.2	-	13900	100	4800	5	*25	2400	.4	26100	2200
8	19	63	24.0	5.2	7.6	3.3	-	5.7	16.0	-	12100	80	4500	20	*25	1800	.2	22300	450
8	26	63	22.5	4.2	7.0	3.0	-	4.0	7.7	-	14500	70	4700	0	*25	2100	.3	27700	12000
9	3	63	21.5	5.2	7.2	3.9	-	5.5	8.2	-	13300	92	5000	0	*25	2200	.4	28240	1800
9	9	63	20.8	3.8	6.6	3.6	-	4.4	9.9	-	10800	88	4800	5	*25	1900	.0	25460	3000
9	16	63	17.6	5.1	7.1	2.0	-	5.4	7.6	-	12300	92	4200	10	*25	2100	.1	24670	1900
9	23	63	16.0	5.3	7.2	1.0	-	1.9	6.7	-	13300	88	4500	5	*25	1960	.2	25000	850
9	30	63	17.6	5.4	7.0	2.5	-	6.5	9.2	-	9100	68	3400	10	*25	1500	.0	18100	2000

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 123B

/FIVE FEET ABOVE BOTTOM/

DATE OF SAMPLE MONTH	DAY	YEAR	TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND 1-HOUR mg/l	CHLORINE DEMAND 24-HOUR mg/l	AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
10	1	62	18.1	3.6	6.0	1.0	-	5.6	-	-	-	-	4150	-	-	-	-	28400	-
10	3	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390
10	8	62	17.8	4.0	7.1	1.1	-	11.4	14.9	-	12950	88	4200	5	*25	1650	.3	25126	220
10	15	62	-	-	7.0	2.0	-	13.9	17.6	-	12150	98	3950	5	*25	1750	.3	23240	290
10	22	62	16.7	3.5	7.0	.2	-	6.7	10.1	-	12250	84	3850	5	*25	1650	.0	22790	240
10	29	62	13.7	3.7	7.4	1.6	-	6.9	15.5	-	12150	88	4300	10	*25	1650	.3	23600	600
11	5	62	10.6	-	7.0	2.1	-	12.2	17.2	-	14100	100	4100	5	*25	1800	.0	25429	15000
11	13	62	10.7	6.0	6.8	4.1	-	5.7	-	-	11550	80	3600	5	*25	1550	.2	22110	27000
11	19	62	7.6	6.3	7.1	2.1	-	10.7	16.6	-	13650	88	4250	5	*25	1800	.1	24360	610
11	26	62	7.5	6.0	6.9	5.1	-	10.9	15.0	-	9800	76	3300	5	*25	1450	.0	19350	400
12	3	62	7.5	6.2	7.1	3.5	-	6.2	13.4	-	11300	84	3950	5	*25	1750	.0	22186	3700
12	10	62	4.1	7.4	7.5	4.7	-	9.1	16.2	-	8750	68	2850	5	*25	1250	.1	16350	1800
12	17	62	1.6	7.2	7.4	2.4	-	8.3	14.0	-	12200	98	4250	5	*25	1600	.1	22900	3400
1	7	63	.8	9.9	7.4	3.3	-	6.4	12.4	-	14900	84	3600	-	*25	1550	.0	21150	400
1	14	63	.0	8.2	7.4	3.0	-	6.4	12.0	-	12700	92	4200	-	*25	1900	.1	24640	300
1	18	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800
1	21	63	.0	-	7.2	2.7	-	12.0	15.4	-	11400	84	3900	-	*25	1600	.0	22115	
1	28	63	1.0	8.6	7.3	7.4	-	8.3	11.4	-	12600	86	3900	-	*25	1750	.2	23287	5400
2	4	63	.2	10.4	7.6	3.5	-	12.6	18.9	-	9050	70	3000	-	*25	1400	.0	17366	600
2	11	63	.5	8.8	7.2	3.3	-	10.9	14.6	-	13150	90	4350	10	*25	1700	.2	24470	100
2	18	63	1.5	10.0	7.1	3.6	-	9.0	14.3	-	13300	92	4250	5	*25	1750	.1	25220	
2	25	63	1.7	9.2	7.2	3.6	-	12.1	17.1	-	10450	88	4100	5	*25	1700	.0	24000	500
3	4	63	2.4	9.9	7.1	3.6	-	8.9	14.5	-	14000	92	4600	5	*25	1750	.1	26000	680
3	11	63	3.2	7.4	7.1	4.0	-	10.2	19.6	-	12000	86	4300	10	*25	1600	.1	23000	
3	18	63	-	-	6.3	2.2	-	-	-	-	9600	76	3100	5	*25	1250	.1	18000	800
3	25	63	4.7	-	6.6	4.6	-	13.4	22.5	-	9500	80	3000	5	*25	1250	.1	18300	540
4	1	63	9.1	-	6.5	3.6	-	12.8	20.8	-	9400	72	3100	5	*25	1260	.0	16900	
4	8	63	9.8	-	6.9	3.1	-	9.3	15.8	-	9400	80	3200	10	*25	1300	.0	17100	3000
4	15	63	9.0	-	6.9	4.5	-	7.9	14.0	-	11200	88	3700	5	*25	1560	.1	21000	2000
4	22	63	12.8	-	6.9	5.1	-	8.8	13.4	-	10300	88	3900	15	*25	1560	.0	21000	1000
4	29	63	11.6	9.4	7.0	3.5	-	8.6	14.5	-	12800	92	4200	10	*25	1640	.0	22000	540
5	6	63	14.0	7.0	-	2.0	-	8.7	13.8	-	16400	124	3600	5	*25	2100	.0	29000	550
5	13	63	14.4	6.4	7.3	3.1	-	8.4	13.4	-	12400	96	4600	10	*25	1560	.1	23000	
5	20	63	19.5	3.4	6.8	2.8	-	12.0	19.5	-	8900	68	3400	10	*25	1250	.0	17500	2000
5	28	63	17.5	1.2	7.5	1.5	-	13.9	16.6	-	10900	80	4100	10	*25	1600	.1	21700	12000
6	3	63	20.0	2.0	7.0	2.1	-	9.1	21.7	-	11800	72	3900	5	*25	1600	.2	20600	160
6	10	63	21.2	2.7	7.2	2.5	-	17.0	22.2	-	12100	78	4200	10	*25	1560	.3	22000	1900
6	17	63	21.4	3.1	7.3	2.6	-	11.9	-	-	11000	76	3900	10	*25	1460	.1	21000	-
6	24	63	-	-	-	4.0	-	15.4	22.9	-	13100	84	4200	10	*25	1760	.5	23500	1900

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW JERSEY

MAJOR BASIN NORTHEAST

MINOR BASIN NEW JERSEY-N.Y. METROPOLITAN AREA

STATION LOCATION RARITAN RIVER AT

PERTH AMBOY, NEW JERSEY 1230

/FIVE FEET ABOVE BOTTOM/

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURB'DITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	24.5	3.8	7.1	2.3	-	5.0	9.5	-	12900	86	4300	5	*25	1760	.3	25000	2300
7	8	63	22.3	6.1	7.3	3.8	-	3.2	4.8	-	15500	96	5000	15	*25	2100	.2	28700	3000
7	15	63	23.5	4.2	-	3.4	-	5.3	9.4	-	12000	78	4300	5	*25	1760	.2	23000	3000
7	22	63	25.8	4.1	6.4	3.0	-	4.3	7.6	-	12900	84	4500	10	*25	1840	.1	25000	3200
7	29	63	26.0	-	6.6	2.0	-	3.6	4.3	-	14400	92	4400	5	*25	2000	.3	25000	400
8	5	63	24.6	3.5	7.2	3.4	-	4.4	5.9	-	14000	94	4600	10	*25	2000	.6	26000	2800
8	12	63	24.5	3.5	7.4	2.3	-	8.1	15.8	-	14600	100	5000	5	*25	2200	.5	26800	900
8	19	63	23.5	4.0	7.8	2.9	-	6.4	16.2	-	13000	90	4800	10	*25	2000	.3	24700	600
8	26	63	21.5	4.1	7.2	2.0	-	3.4	6.0	-	16300	88	4000	5	*25	1960	.5	24900	8600
9	3	63	22.5	4.7	7.1	2.8	-	6.0	8.3	-	13400	92	4700	0	*25	2000	.4	28280	900
9	9	63	20.8	3.5	6.8	3.5	-	4.9	9.7	-	12000	86	4800	5	*25	200	.0	25780	2000
9	16	63	17.6	4.8	7.2	3.8	-	5.1	5.1	-	12900	84	4300	10	*25	2000	.0	25790	1500
9	23	63	12.0	5.0	7.3	1.9	-	3.5	5.2	-	13500	92	4600	5	*25	2200	.2	27000	580
9	30	63	17.6	4.0	7.0	2.0	-	6.6	10.4	-	12400	84	4000	10	*25	1960	.0	24000	1100

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Bound Brook, New Jersey
Operated by U.S. Geological Survey

STATE: New Jersey

MAJOR BASIN: Northeast

MINOR BASIN: New Jersey-New York Metropolitan Area

STATION LOCATION: Raritan River at Perth Amboy, New Jersey

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.329	.346	.629	.351	.413	.360	1.010	.980	.231	.130	.132	.057
2	.378	.368	.589	.347	.430	1.920	1.010	.674	.214	.180	.235	.053
3	.235	.512	.559	.347	1.280	2.760	1.000	.472	.246	.151	.208	.051
4	.209	1.950	.539	.333	1.120	2.610	.920	.403	.310	.116	.170	.076
5	.346	.960	.619	.333	.722	5.980	.762	.343	.289	.095	.123	.097
6	.594	.667	1.420	.336	.843	9.120	.699	.341	.263	.081	.087	.083
7	.426	.545	2.910	.335	1.210	10.300	.667	.335	.258	.087	.073	.075
8	.326	.455	1.450	.335	.936	4.780	.625	.315	.236	.114	.071	.069
9	.384	.389	1.150	.354	.604	2.650	.595	.299	.222	.120	.066	.072
10	.674	4.650	1.050	.389	.554	2.220	.585	.305	.210	.107	.060	.067
11	.502	3.790	.721	.465	.851	2.410	.535	.372	.224	.089	.057	.063
12	.401	1.660	.555	1.600	5.870	3.270	.524	.396	.207	.083	.058	.065
13	.356	1.240	.535	2.780	5.040	2.750	.474	.336	.194	.080	.062	.321
14	.306	1.010	.495	1.960	2.150	2.190	.444	.311	.191	.107	.056	.152
15	.263	.825	.441	1.050	1.140	2.050	.413	.284	.198	.144	.131	.130
16	.249	.715	.484	.801	.733	1.680	.408	.248	.228	.165	.138	.112
17	.241	.629	.436	.629	.635	2.890	.395	.239	.224	.137	.110	.138
18	.222	.709	.484	.619	.596	2.850	.388	.335	.199	.117	.093	.156
19	.206	1.880	.484	.594	.952	2.110	.366	.651	.169	.095	.072	.121
20	.201	1.290	.474	2.680	2.000	2.940	.359	.419	.151	.119	.093	.102
21	.200	1.160	.322	2.560	2.820	3.030	.340	.365	.158	.161	.124	.089
22	.198	5.210	.387	1.020	1.020	2.090	.341	.471	.157	.168	.121	.088
23	.196	3.890	.640	1.040	.822	1.660	.341	.411	.132	.143	.103	.082
24	.191	2.180	.547	.889	.638	1.400	.341	.303	.120	.122	.084	.072
25	.179	1.470	.456	.624	.512	1.340	.315	.277	.101	.106	.078	.072
26	.195	1.160	.506	.606	.452	1.380	.304	.266	.077	.091	.079	.072
27	.228	.968	.475	.599	.360	2.170	.299	.278	.072	.082	.067	.072
28	.220	.838	.444	.626	.366	1.880	.315	.239	.072	.091	.059	.070
29	.206	.760	.381	.505		1.460	.303	.239	.089	.237	.056	.190
30	.194	.683	.397	.445		1.250	.406	.257	.126	.171	.049	.231
31	.233		.440	.445		1.160		.244		.117	.058	

ST. LAWRENCE RIVER AT MASSENA, NEW YORK

Samples are collected at the intake of the General Motors Corporation Aluminum Foundry. This Pollution Surveillance System station is a few miles upstream from the point where the St. Lawrence River flows exclusively through Canada. For approximately 114 miles, above this point, the river has formed the Canadian-United States boundary. Ogdensburg, New York is the nearest upstream community on the United States side. This city discharges raw sewage from a population of some 16,000 into the river about 50 miles upstream. Hydroelectric power is a major river use and the St. Lawrence is a series of impoundments from Lake Ontario to the tidal zone at Quebec. Metal reduction plants are concentrated in this area because of the availability of electrical power.

Station Location: St. Lawrence River at Massena, New York

Major Basin: Northeast

Minor Basin: St. Lawrence River

Station at: 45°00" Latitude 74°47' Longitude

Miles above mouth: 422

Activation Date: April 1960

Sampled by: Chevrolet Motor Division
General Motors Corporation Aluminum Foundry

Field Analysis by: Chevrolet Motor Division
General Motors Corporation Aluminum Foundry

Other Cooperating Agencies: New York State Department of Health

Hydrologic Data:

Nearest pertinent gaging station: International Rapids Section

Gaging station operated by: U.S. Army Corps of Engineers

Drainage area at gaging station: Not available

Period of record: 1860 to present

Average discharge in record period: Not available

Maximum discharge in record period: Not available

Minimum discharge in record period: " "

Remarks: Flow regulated by Saint Lawrence Seaway Development.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.33	3.05
	Na	13	12
	K	1.6	1.3
Analysis by Spectrographic methods Results in micrograms per liter	Zn	9	4
	Cd	*2	*2
	As	*18	*17
	B	28	23
	P	27	*8
	Fe	171	*3
	Mo	4	*4
	Mn	*.4	*1.7
	Al	—	84
	Be	*.05	*.04
	Cu	2	8
	Ag	*.4	*.4
	Ni	*1	*2
	Co	*4	*2
	Pb	9	4
	Cr	10	25
	V	*2	8
	Ba	27	41
	Sr	81	84

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.2	.2	April to June	—	—
January to March	—	—	July to September	2.3	.2

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN ST. LAWRENCE RIVER
STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK

63

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER														RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	1	62	11	2	-	-	-	-	-	-	0	8	11	8	11	11						
10	8	62	11	2	-	-	-	-	-	-	6	6	7	7	13	9						
10	15	62	12	20	0	0	1	1	1	1	3	6	16	7	19	9						
10	22	62	11	9	-	-	-	-	-	-	4	5	9	7	13	9						
10	29	62	11	26	-	-	-	-	-	-	20	3	8	4	28	5						
11	26	62	12	12*	0	0	0	1	0	1	24	6	23	8	47	10						
12	31	62	1	16*	0	0	1	1	1	1	6	6	17	8	23	10						
1	28	63	2	21*	0	1	0	1	0	1	2	6	13	8	15	10						
2	28	63	3	15*	0	0	0	1	0	1	0	12	8	6	8	13						
3	25	63	4	25*	0	0	0	1	0	1	1	6	15	7	16	9						
4	29	63	5	22*	0	0	0	0	0	0	17	6	26	7	43	9						
5	27	63	6	19*	0	0	1	1	1	1	17	6	26	8	43	10						
6	24	63	7	24*	0	0	0	1	0	1	6	5	28	9	34	10						
7	29	63	8	23*	1	1	0	1	1	1	15	7	15	7	30	10						
8	26	63	9	25*	0	0	0	1	0	1	6	5	19	7	25	9						
9	30	63	10	31*	1	1	1	1	2	1	4	6	13	8	17	10						

PLANKTON POPULATION

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN ST. LAWRENCE RIVER
STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK 063

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA Number per ml.	MICROINVERTEBRATES																	
			1ST		2ND		3RD		4TH				ROTIFERS										CRUSTACEA							
														GENERA AND COUNT LEVEL (See text for Codes)										GENERA AND COUNT LEVEL (See text for Codes)							
														1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT		PROTOZOA (Identifiable) Number per ml.	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
10	1	62	95	16	16	12	59	9	82	7	56	0	0	2									0						0	0
10	17	62	59	28	76	16	16	10	95	6	40	-	0	57	11	3	17	3	21	1			0						24	0
11	5	62	95	19	16	13	80	8	47	7	53	0	0	252	11	6	17	4	15	2			45	51	4	50	2	76	1	15	0
11	19	62	80	16	59	14	16	13	9	10	47	0	0	0									1							0	0
12	3	62	95	45	59	20	47	6	80	6	23	60	0	2									6	51	2					0	0
12	17	62	95	26	9	15	47	10	80	10	39	0	0	0									0							0	0
1	7	63	95	33	47	17	60	14	59	13	23	0	0	2									2							0	0
1	20	63	82	21	95	19	80	14	59	11	35	0	0	3									0							0	0
2	4	63	80	32	9	16	95	15	82	8	29	60	0	0									0							1	0
2	18	63	80	23	47	14	82	11	9	10	42	0	0	0									2							0	0
3	4	63	80	28	47	15	82	10	9	10	37	-	-	0									0							0	0
3	18	63	82	28	95	14	59	14	80	9	35	-	-	2									0							2	0
4	1	63	82	31	47	8	9	6	51	5	50	-	-	1									0							0	0
4	15	63	82	62	9	8	47	8	80	4	18	-	-	0									0							0	0
5	6	63	82	33	9	15	1	11	47	9	32	-	-	-									-							-	-
5	20	63	47	45	9	14	35	11	71	7	23	-	-	-									-							-	-
6	3	63	35	63	82	12	9	7	47	6	12	-	-	-									-							-	-
6	17	63	47	23	35	16	2	6	16	6	49	-	-	-									-							-	-
7	15	63										-	-	-									-							-	-
8	5	63										-	-	-									-							-	-
8	19	63										-	-	-									-							-	-
9	3	63										-	-	-									-							-	-
9	16	63										-	-	-									-							-	-

PLANKTON POPULATION

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN ST. LAWRENCE RIVER
STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK

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DATE OF SAMPLE			ALGAE (Number per milliliter)									INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	1	62	900	40	0	40	60	0	0	420	300	0	130	71	2																
10	17	62	200	0	0	70	0	80	0	10	70	0	10																		
11	5	62	800	0	0	120	0	80	0	80	560	0	0																		
11	19	62	300	20	0	30	0	20	0	120	90	80	200																		
12	3	62	200	0	20	30	0	0	0	90	90	0	20																		
12	17	62	200	0	30	30	0	0	0	50	140	60	30																		
1	7	63	400	0	0	0	0	0	0	280	70	140	0																		
1	20	63	400	0	40	40	0	0	0	210	60	40	20	71	1																
2	4	63	200	0	60	0	0	0	10	100	70	70	10																		
2	18	63	500	0	0	0	0	0	200	240	40	40	20																		
3	4	63	00	0	0	0	0	0	0	30	20	50	30																		
3	18	63	200	0	0	0	0	0	20	110	50	120	30																		
4	1	63	200	0	0	20	0	20	0	70	40	40	310																		
4	15	63	500	10	130	10	0	0	10	210	150	10	40	71	1																
5	6	63	800	0	20	20	0	0	0	180	550	70	220	77	2																
5	20	63	700	0	40	20	0	0	0	70	570	0	220	77	1																
6	3	63	800	0	150	170	0	20	20	20	460	20	150	82	2																
6	17	63	300	0	40	10	0	10	10	10	180	10	10																		
7	15	63	100	20	20	0	20	0	0	0	20	0	20																		
8	5	63	100	0	0	40	0	0	0	90	0	90	0																		
8	19	63	700	40	20	130	0	40	0	150	300	110	390																		
9	3	63	00	0	0	0	0	20	0	30	0	30	20																		
9	16	63	100	0	20	20	0	20	0	0	40	0	20																		

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE NEW YORK

MAJOR BASIN NORTHEAST

MINOR BASIN ST. LAWRENCE RIVER

STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK 63

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES									
BEGINNING			END								NEUTRALS							
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLOROFORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGENATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	12	62	11	13	5920	202	49	153	1	10	24	2	8	14	0	5	2	1	6
12	11	62	12	27	5780	201	32	169	1	6	16	1	5	10	0	4	1	1	3
5	13	63	6	13	5628	120	50	70	2	11	22	1	7	13	1	6	3	1	5
7	10	63	7	25	5524	132	53	79	2	12	20	1	7	12	0	6	3	1	9
8	13	63	8	27	5291	170	52	118	1	14	22	1	7	13	1	6	3	1	5
9	17	63	10	2	4660	154	54	100	2	15	18	1	5	11	1	6	4	1	8

CHEMICAL. PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN ST. LAWRENCE RIVER
STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK

63

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	15.6	-	8.0	-	-	-	-	-	21	89	123	5	5	-	-	195	5
10	8	62	15.6	-	8.0	-	-	-	-	-	21	85	123	7	20	-	-	187	80
10	15	62	13.9	-	8.2	-	-	-	-	-	19	88	111	6	1	-	-	189	190
10	22	62	12.8	-	8.0	-	-	-	-	-	21	89	126	6	1	-	-	197	<5
10	29	62	10.0	-	8.1	-	-	-	-	-	21	90	130	6	2	-	-	186	150
11	5	62	8.9	-	8.1	-	-	-	-	-	23	89	126	6	5	-	-	189	<5
11	12	62	6.7	-	8.1	-	-	-	-	-	21	89	128	6	5	-	-	197	<5
11	19	62	5.3	-	8.1	-	-	-	-	-	23	90	127	5	22	-	-	209	<5
11	26	62	7.2	-	8.1	-	-	-	-	-	21	89	123	5	10	-	-	204	<5
12	3	62	5.6	-	8.3	-	-	-	-	-	21	94	128	3	1	-	-	212	<5
12	10	62	4.4	-	8.3	-	-	-	-	-	19	92	128	3	10	-	-	181	150
12	17	62	2.8	-	8.8	-	-	-	-	-	21	98	125	2	2	-	-	185	<5
12	31	62	.0	-	7.8	-	-	-	-	-	23	92	128	0	1	-	-	187	<5
1	7	63	1.7	-	7.9	-	-	-	-	-	23	89	130	1	1	-	-	195	<5
1	14	63	1.1	-	8.4	-	-	-	-	-	23	95	130	2	1	-	-	187	<5
1	20	63	1.7	-	8.2	-	-	-	-	-	21	93	130	3	3	-	-	172	<5
1	28	63	.0	-	8.2	-	-	-	-	-	21	94	133	2	0	-	-	160	<5
2	4	63	.6	-	8.2	-	-	-	-	-	23	92	128	1	0	-	-	204	50
2	11	63	.6	-	8.2	-	-	-	-	-	21	94	130	3	0	-	-	247	10
2	18	63	.6	-	8.2	-	-	-	-	-	23	94	131	1	0	-	-	181	60
2	25	63	.6	-	8.1	-	-	-	-	-	23	90	129	2	2	-	-	191	28000
3	4	63	.3	-	8.3	-	-	-	-	-	28	94	128	3	2	-	-	192	<5
3	11	63	.3	-	8.0	-	-	-	-	-	21	92	130	2	0	-	-	198	50
3	18	63	4.5	-	7.9	-	-	-	-	-	27	91	124	2	3	-	-	189	1000
3	25	63	2.2	-	7.9	-	-	-	-	-	22	90	126	2	2	-	-	174	180
4	1	63	1.7	-	7.6	-	-	-	-	-	15	74	116	10	10	-	-	161	<5
4	8	63	2.2	-	7.4	-	-	-	-	-	13	68	95	30	1	-	-	142	700
4	15	63	3.9	-	7.7	-	-	-	-	-	15	85	120	5	1	-	-	170	150
4	22	63	5.6	-	8.1	-	-	-	-	-	15	80	115	6	1	-	-	168	2500
4	29	63	4.5	-	8.2	-	-	-	-	-	23	85	116	2	2	-	-	181	-
5	6	63	8.9	-	7.3	-	-	-	-	-	23	75	128	5	10	-	-	186	<5
5	13	63	8.9	-	8.4	-	-	-	-	-	19	88	114	3	0	-	-	186	-
5	20	63	12.2	-	9.6	-	-	-	-	-	19	93	119	3	22	-	-	181	-
5	27	63	12.8	-	8.6	-	-	-	-	-	23	90	120	3	0	-	-	183	<5
6	3	63	14.4	-	8.4	-	-	-	-	-	19	88	119	3	0	-	-	202	<5
6	10	63	16.7	-	8.2	-	-	-	-	-	19	88	121	3	0	-	-	194	300
6	17	63	16.7	-	8.3	-	-	-	-	-	17	89	120	3	0	-	-	193	300
6	24	63	16.1	-	8.3	-	-	-	-	-	23	90	123	2	0	-	-	193	50

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE NEW YORK
MAJOR BASIN NORTHEAST
MINOR BASIN ST. LAWRENCE RIVER
STATION LOCATION ST. LAWRENCE RIVER AT MASSENA, NEW YORK 63

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	1	63	19.4	-	8.4	-	-	-	-	-	23	91	110	2	43	-	-	208	-
7	8	63	20.0	-	8.3	-	-	-	-	-	23	91	123	1	0	-	-	203	50
7	15	63	20.0	-	8.1	-	-	-	-	-	21	88	120	2	2	-	-	193	5
7	22	63	21.1	-	8.2	-	-	-	-	-	24	89	126	1	0	-	-	209	*5
7	29	63	23.2	-	8.3	-	-	-	-	-	25	88	125	1	3	-	-	199	230
8	5	63	21.6	-	8.4	-	-	-	-	-	23	89	122	2	1	-	-	200	5500
8	12	63	21.7	-	8.3	-	-	-	-	-	23	90	124	2	0	-	-	201	300
8	19	63	20.6	-	8.1	-	-	-	-	-	25	89	124	2	1	-	-	212	-
8	26	63	20.6	-	8.3	-	-	-	-	-	25	92	126	1	0	-	-	188	*5
9	3	63	20.6	-	8.2	-	-	-	-	-	25	91	122	1	2	-	-	185	*5
9	9	63	19.4	-	8.2	-	-	-	-	-	23	90	121	1	1	-	-	186	*5
9	16	63	18.3	-	8.3	-	-	-	-	-	23	93	120	1	2	-	-	203	*5
9	23	63	16.7	-	8.3	-	-	-	-	-	23	95	127	2	2	-	-	202	*5
9	30	63	14.4	-	8.4	-	-	-	-	-	21	95	126	1	0	-	-	202	*5

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at St. Lawrence River - International Rapids Section
(St. Lawrence Power Pool)
Supplied by U.S. Army Corps of Engineers

STATE: New York

MAJOR BASIN: Northeast

MINOR BASIN: St. Lawrence River

STATION LOCATION: St. Lawrence River at Massena, New York

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	211.000	210.000	210.000	193.000	234.000	212.000	194.000	188.000	202.000	209.000	218.000	214.000
2	211.000	210.000	210.000	214.000	191.000	187.000	195.000	188.000	203.000	209.000	218.000	214.000
3	212.000	205.000	210.000	214.000	191.000	187.000	194.000	188.000	203.000	209.000	216.000	214.000
4	211.000	205.000	210.000	214.000	212.000	208.000	194.000	188.000	203.000	209.000	216.000	214.000
5	210.000	205.000	210.000	198.000	212.000	208.000	194.000	188.000	203.000	210.000	216.000	214.000
6	210.000	205.000	210.000	193.000	212.000	208.000	173.000	188.000	203.000	210.000	216.000	214.000
7	210.000	205.000	210.000	213.000	212.000	208.000	173.000	188.000	203.000	210.000	216.000	211.000
8	210.000	205.000	210.000	213.000	212.000	208.000	194.000	188.000	205.000	210.000	216.000	211.000
9	210.000	205.000	210.000	213.000	191.000	187.000	194.000	188.000	205.000	210.000	216.000	211.000
10	210.000	206.000	210.000	213.000	191.000	187.000	194.000	188.000	205.000	210.000	216.000	211.000
11	210.000	206.000	210.000	213.000	212.000	208.000	194.000	188.000	205.000	210.000	216.000	211.000
12	210.000	206.000	210.000	193.000	212.000	208.000	194.000	188.000	205.000	210.000	216.000	211.000
13	211.000	206.000	210.000	193.000	212.000	208.000	173.000	188.000	205.000	218.000	216.000	211.000
14	211.000	206.000	210.000	214.000	212.000	208.000	173.000	188.000	205.000	218.000	216.000	213.000
15	211.000	206.000	200.000	214.000	212.000	208.000	194.000	188.000	208.000	218.000	216.000	213.000
16	211.000	206.000	200.000	214.000	191.000	177.000	194.000	188.000	208.000	218.000	216.000	213.000
17	211.000	204.000	214.000	214.000	191.000	177.000	194.000	188.000	208.000	218.000	217.000	213.000
18	211.000	204.000	214.000	214.000	212.000	198.000	194.000	188.000	208.000	218.000	217.000	213.000
19	211.000	204.000	214.000	193.000	212.000	198.000	193.000	188.000	208.000	218.000	217.000	213.000
20	210.000	207.000	214.000	193.000	212.000	198.000	188.000	188.000	208.000	215.000	217.000	213.000
21	210.000	210.000	214.000	214.000	212.000	198.000	188.000	188.000	208.000	215.000	217.000	210.000
22	210.000	210.000	216.000	214.000	212.000	198.000	188.000	188.000	209.000	215.000	217.000	210.000
23	210.000	210.000	195.000	214.000	191.000	177.000	188.000	188.000	209.000	215.000	217.000	210.000
24	210.000	210.000	216.000	214.000	191.000	177.000	188.000	188.000	209.000	215.000	217.000	210.000
25	210.000	210.000	195.000	214.000	212.000	198.000	188.000	188.000	209.000	215.000	217.000	210.000
26	210.000	210.000	216.000	193.000	212.000	198.000	188.000	188.000	209.000	215.000	217.000	210.000
27	210.000	210.000	216.000	193.000	212.000	198.000	188.000	188.000	209.000	218.000	217.000	210.000
28	211.000	210.000	216.000	214.000	212.000	199.000	188.000	188.000	209.000	218.000	217.000	215.000
29	210.000	210.000	214.000	214.000		198.000	188.000	188.000	209.000	218.000	217.000	215.000
30	210.000	210.000	193.000	225.000		173.000	188.000	188.000	209.000	218.000	217.000	215.000
31	210.000		214.000	234.000		173.000		188.000		218.000	214.000	

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